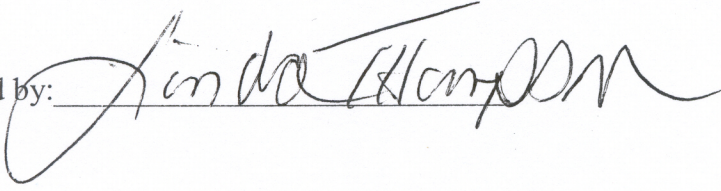


Moved by:



An ordinance replacing Chapter 9-900 of the Codified Ordinances of the City of Harrisburg, entitled "Storm Water Management" by adopting "Spring Creek and Paxton Creek Watershed Act 167 Stormwater Management Plan", which was approved and adopted by both the County of Dauphin and the Department of Environmental Protection.

WHEREAS, the purpose of this ordinance is to promote health, safety and the welfare within the Spring Creek and Paxton Creek Watershed by minimizing the harms and maximizing the benefits of managing stormwater runoff, and;

WHEREAS, the updated watershed plan for Spring Creek and Paxton Creek Watershed, was adopted by Dauphin County and approved by the Department of Environmental Protection (hereinafter, "DEP") pursuant to the Stormwater Management Act, Act of October 4, 1978, 32P.S., P.L. 864, (No. 167), Section 680.1 et seq, as amended by Act 63 of May 24, 1984 and the Stormwater Management Guidelines adopted by the General Assembly, and;

WHEREAS, the subject plan was reviewed by DEP and it was determined to be consistent with municipal floodplain management plans, consistent with State and Federal flood control programs, is compatible with other watershed stormwater plans within the surrounding basin, and is consistent with the policies and purposes of the Stormwater Management Act; and,

WHEREAS, Section 11(b) of the Stormwater Management Act requires the adoption and approval of the subject plan by each municipality within the subject watershed by such ordinances and regulations, including zoning, subdivision and development, building code, and erosion and sedimentation ordinances

as are necessary to regulate development within the municipality in a manner consistent with the applicable watershed stormwater plan and the provisions of the Stormwater Management Act; and

WHEREAS, the City is requested to notify DEP when it is compliant; and

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF HARRISBURG, AND IT IS HEREBY ENACTED BY AUTHORITY OF THE SAME, as follows:

2nd Maria Martin Roberts

Passed the City Council

November 28, 2006

Vera Jean White
President of City Council

Attest

[Signature]
City Clerk



Approved



Returned to City Council with objections

[Signature]
Mayor

12/6/06
Date

TABLE OF CONTENTS

ARTICLE I-GENERAL PROVISIONS.....	3
9-900 STATEMENT OF FINDINGS	3
9-901 PURPOSE	3
9-902 STATUTORY AUTHORITY	4
9-903 APPLICABILITY	4
9-904 DUTY OF PERSONS ENGAGED IN THE DEVELOPMENT OF LAND	5
ARTICLE III – STORMWATER MANAGEMENT.....	14
9-906 GENERAL REQUIREMENTS	14
9-907 EXEMPTIONS	16
TABLE 1 17	
9-908 STORMWATER MANAGEMENT DISTRICTS	18
9-909 STORMWATER MANAGEMENT DISTRICT IMPLEMENTATION PROVISIONS	18
9-910 DESIGN CRITERIA FOR STORMWATER MANAGEMENT FACILITIES	20
9-911 CALCULATION METHODOLOGY	21
9-912 EROSION AND SEDIMENTATION REQUIREMENTS DURING EARTH DISTURBANCE ACTIVITIES.....	23
9-913 WATER QUALITY REQUIREMENTS AFTER EARTH DISTURBANCE ACTIVITIES ARE COMPLETE	23
9-914 GROUND WATER RECHARGE (INFILTRATION/RECHARGE/RETENTION).....	24
9-915 WATER QUALITY REQUIREMENTS.....	27
9-916 STREAM BANK PROTECTION REQUIREMENTS.....	28
9-917 GENERAL REQUIREMENTS	29
9-918 DRAINAGE PLAN CONTENTS	29
9-918 PLAN SUBMISSION	32
9-919 DRAINAGE PLAN REVIEW	33
9-920 MODIFICATION OF PLANS	34
9-921 RESUBMISSION OF DISAPPROVED DRAINAGE PLANS	34
ARTICLE V-INSPECTIONS.....	35
9-922 SCHEDULE OF INSPECTIONS	35
9-923 RIGHT OF ENTRY	35
9-924 STORMWATER MANAGEMENT EASEMENTS	35
ARTICLE VI-PROHIBITIONS.....	36
9-925 PROHIBITED DISCHARGES.....	36
9-926 PROHIBITED CONNECTIONS	36
9-927 ROOF DRAINS	37
9-928 ALTERATION OF BMPs.....	37
ARTICLE VII-FEES AND EXPENSES.....	38
9-929 GENERAL	38
9-930 CITY DRAINAGE PLAN REVIEW FEE	38
9-931 EXPENSES COVERED BY FEES	38
9-932 RECORDING OF APPROVED DRAINAGE PLAN AND RELATED AGREEMENTS.....	38
ARTICLE VIII-MAINTENANCE RESPONSIBILITIES.....	39
9-933 PERFORMANCE GUARANTEE.....	39
9-934 MAINTENANCE RESPONSIBILITIES	39
9-935 MAINTENANCE AGREEMENT FOR PRIVATELY OWNED STORMWATER FACILITIES	39
9-936 CITY STORMWATER MAINTENANCE FUND	40
9-937 POST-CONSTRUCTION MAINTENANCE INSPECTIONS.....	40
ARTICLE IX-ENFORCEMENT AND PENALTIES.....	41
9-938 RIGHT-OF-ENTRY	41
9-939 NOTIFICATION	41
9-940 ENFORCEMENT	41
9-941 PUBLIC NUISANCE.....	42
9-942 PENALTIES	43
9-943 APPEALS	43

100	<i>APPENDIX A - STORMWATER MANAGEMENT DESIGN CRITERIA.....</i>	<i>44</i>
101	<i>APPENDIX B - DRAINAGE PLAN APPLICATION AND FEE SCHEDULE.....</i>	<i>49</i>
102	<i>APPENDIX C - MAINTENANCE & MONITORING AGREEMENT.....</i>	<i>54</i>
103	<i>APPENDIX D - CHANNEL PROTECTION STORAGE.....</i>	<i>57</i>
104	<i>APPENDIX E - LOW IMPACT DEVELOPMENT PRACTICES.....</i>	<i>60</i>
105	REPEALER 62	
106	SEVERABILITY.....	62
107	COMPATIBILITY WITH OTHER ORDINANCE REQUIREMENTS.....	62
108		

ARTICLE I-GENERAL PROVISIONS

9-900 Statement of Findings

- (a) The governing body of the City of Harrisburg finds that:
- (1) Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, undermines floodplain management and flood reduction efforts in upstream and downstream communities, reduces groundwater recharge, and threatens public health and safety.
 - (2) A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of the City and all the people of the Commonwealth, their resources, and the environment.
 - (3) Inadequate planning and management of stormwater runoff resulting from land development and redevelopment throughout a watershed can also harm surface water resources by changing the natural hydrologic patterns; accelerating stream flows (which increase scour and erosion of streambeds and stream banks thereby elevating sedimentation); destroying aquatic habitat; and elevating aquatic pollutant concentrations and loadings such as sediments, nutrients, heavy metals, and pathogens. Groundwater resources are also impacted through loss of recharge.
 - (4) Stormwater can be an important water resource by providing groundwater recharge for water supplies and base flow of streams, which also protects and maintains water quality.
 - (5) Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.
 - (6) Federal and state regulations require certain Cities to implement a program of stormwater controls. These Cities are required to obtain a permit for stormwater discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).
 - (7) Non-stormwater discharges to City separate storm sewer system can contribute to pollution of waters of the Commonwealth by the City.

9-901 Purpose

- (a) The purpose of this Ordinance is to promote health, safety, and welfare within the Spring Creek and Paxton Creek Watershed by minimizing the harms and maximizing the benefits described in 9-900 of this Ordinance through provisions designed to:
- (1) Manage accelerated runoff and erosion and sedimentation problems at their source, by regulating activities that cause these problems.
 - (2) Utilize and preserve the existing natural drainage systems.

- (3) Encourage infiltration of stormwater, where appropriate, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality, and to otherwise protect water resources.
- (4) Maintain existing flows and quality of streams and watercourses in the City and the Commonwealth.
- (5) Preserve and restore the flood-carrying capacity of streams and prevent to the extent possible, scour and erosion of stream banks and streambeds.
- (6) Provide proper operations and maintenance of all temporary and permanent stormwater management facilities and BMPs that are constructed and implemented in the City.
- (7) Provide performance standards and design criteria for watershed-wide stormwater management and planning.
- (8) Manage stormwater impacts close to the runoff source, with a minimum of structures and a maximum use of natural processes.
- (9) Meet legal water quality requirements under state law, including regulations at 25 Pa. Code Chapter 93.4a to protect and maintain "existing uses" and maintain the level of water quality to support those uses in all streams and to protect and maintain water quality in "special protection" streams.
- (10) Provide a mechanism to identify controls necessary to meet the NPDES permit requirements.
- (11) Implement an illegal discharge detection and elimination program to address non-stormwater discharges into the City's separate storm sewer system.

9-902 Statutory Authority

(a) Primary Authority:

The City is empowered to regulate land use activities that affect runoff by the authority of the Act of October 4, 1978 32 P.S., P.L. 864 (Act 167) Section 680.1 et seq., as amended, the "Storm Water Management Act", [and the applicable City Code].

(b) Secondary Authority:

The City also is empowered to regulate land use activities that affect runoff by the authority of the Act of July 31, 1968, P.L. 805, No. 247, The Pennsylvania Municipalities Planning Code, as amended by Act 170 of December 21, 1988 and Act 131 of December 14, 1992.

9-903 Applicability

- (a) This Ordinance shall apply to those areas of the City that are located within the Spring Creek Watershed, as delineated in Plate 5 and Paxton Creek Watershed, as delineated in Plate 6 of the Spring Creek and Paxton Creek Act 167 Stormwater management plan, which is hereby adopted as part of this Ordinance, any Regulated Activity within the City, and all stormwater runoff entering into the City's separate storm sewer system from lands within the boundaries of the City.

- 209
210
211 (b) Earth Disturbance activities and associated stormwater management controls are also regulated
212 under existing state law and implementing regulations. This Ordinance shall operate in
213 coordination with those parallel requirements; the requirements of this Ordinance shall be no
214 less restrictive in meeting the purposes of this Ordinance than state law.
215
216 (c) The following activities are defined as "Regulated Activities" and shall be regulated by this
217 Ordinance:
218
219 (1) Land development.
220 (2) Subdivision.
221 (3) Construction of new or additional impervious or semi-pervious surfaces (driveways, parking
222 lots, etc.).
223 (4) Construction of new buildings or additions to existing buildings.
224 (5) Diversion or piping of any natural or man-made stream channel.
225 (6) Installation of stormwater management facilities or appurtenances thereto.
226 (7) Earth Disturbance Activities.
227
228

229 **9-904 Duty of Persons Engaged in the Development of Land**
230

- 231 (a) Notwithstanding any provision(s) of this Ordinance, including exemptions, any landowner or any
232 person engaged in the alteration or development of land which may affect stormwater runoff
233 characteristics shall implement such measures as are reasonably necessary to prevent injury to
234 health, safety, or other property. Such measures also shall include actions as are required to
235 manage the rate, volume, direction, and quality of resulting stormwater runoff in a manner which
236 otherwise adequately protects health, property, and water quality.

ARTICLE II-DEFINITIONS

9-905 Definitions

(a) For the purposes of this Ordinance, certain terms and words used herein shall be interpreted as follows:

- (1) Words used in the present tense include the future tense; the singular number includes the plural and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- (2) The word "includes" or "including" shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.
- (3) The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, or any other similar entity.
- (4) The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.
- (5) The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained".

Accelerated Erosion - The removal of the surface of the land through the combined action of human activity and the natural processes at a rate greater than would occur because of the natural process alone.

Agricultural Activities - The work of producing crops and raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. Construction of new buildings or impervious area is not considered an agricultural activity.

Alteration - As applied to land, a change in topography as a result of the moving of soil and rock from one location or position to another; changing of surface conditions by causing the surface to be more or less impervious; land disturbance.

Applicant - A landowner, developer, or other person who has filed an application for approval to engage in any Regulated Activities at a project site within the City.

BMPs (Best Management Practices) - Activities, facilities, designs, measures or procedures used to manage stormwater impacts from Earth Disturbance activities; to meet State Water Quality Requirements; to promote groundwater recharge; and to otherwise meet the purposes of this Ordinance. BMPs include, but are not limited to: infiltration, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, forested buffers, sand filters, and detention basins.

Channel Erosion - The widening, deepening, and headward cutting of small channels and waterways, due to erosion caused by moderate to large floods.

Cistern - An underground reservoir or tank for storing rainwater.

City - The City of Harrisburg, Dauphin County, Pennsylvania

Conservation District - The Dauphin County Conservation District.

Culvert - A structure with appurtenant works that carries a stream under or through an embankment or fill.

Dam - An artificial barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or another fluid or semifluid, or a refuse bank, fill or structure for highway, railroad or other purposes which does or may impound water or another fluid or semifluid.

DEP - The Pennsylvania Department of Environmental Protection.

Design Storm - The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g. a 25-year storm) and duration (e.g. 24-hours), used in the design and evaluation of stormwater management systems.

Designee - The agent of the City of Harrisburg and/or agent of the governing body involved with the administration, review or enforcement of any provisions of this Ordinance by contract or memorandum of understanding.

Detention Basin - An impoundment structure designed to manage stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Developer - A person, partnership, association, corporation, or other entity, or any responsible person therein or agent thereof, that undertakes any Regulated Activity of this Ordinance.

Development - See “Earth Disturbance Activity”. This term includes redevelopment.

Development Site – Site - The specific tract of land for which a Regulated Activity is proposed.

Downslope Property Line - That portion of the property line of the lot, tract, or parcels of land being developed located such that all overland or pipe flow from the site would be directed towards it.

Drainage Conveyance Facility - A stormwater management facility designed to transmit stormwater runoff and shall include streams, channels, swales, pipes, conduits, culverts, storm sewers, etc.

Drainage Easement - A right granted by a landowner to a grantee, allowing the use of private land for stormwater management purposes.

Drainage Permit - A permit issued by the City governing body after the Drainage Plan has been approved. Said permit is issued prior to or with the final City approval.

Drainage Plan - The documentation of the stormwater management system, if any, to be used for a given development site, the contents of which are established in 9-918.

Drainageway - Any natural or artificial watercourse, trench, ditch, pipe, swale, channel, or similar depression into which surface water flows.

Earth Disturbance Activity - See 25 Pa. Code Chapter 102, except that this Ordinance does not further regulate agricultural plowing or tilling.

Erosion - The movement of soil particles by the action of water, wind, ice or other natural forces.

Erosion and Sediment Pollution Control Plan - A plan, which is designed to minimize accelerated erosion and sedimentation.

Exceptional Value Waters - Surface waters of high quality, which satisfies Pennsylvania Code Title 25 Environmental Protection, Chapter 93 Water Quality Standards 93.4b(b) (relating to anti-degradation)

Existing Conditions - The initial condition of a project site prior to the proposed construction. If the initial condition of the site is undeveloped land, the land use shall be considered as "meadow" unless the natural land cover is proven to generate lower Curve Numbers or Rational "C" value, such as forested lands.

Flood - A general but temporary condition of partial or complete inundation of normally dry land areas from the overflow of streams, rivers and other waters of the Commonwealth.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable Federal Emergency Management Agency (FEMA) as being a special flood hazard area. Also included are areas that comprise Group 13 Soils, as listed in Appendix A of the Pennsylvania Department of Environmental Protection (PA DEP) Technical Manual for Sewage Enforcement Officers (as amended or replaced from time to time by PA DEP).

Floodway - The channel of the watercourse and those portions of the adjoining floodplains that are reasonably required to carry and discharge the 100-year frequency flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year frequency floodway, it is assumed - absent evidence to the contrary - that the floodway extends from the stream to 50 feet from the top of the bank of the stream.

Forest Management/Timber Operations - Planning and activities necessary for the management of forestland. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation and reforestation.

Freeboard - A vertical distance between the elevation of the design high water and the top of a dam, levee, tank, basin, or diversion ridge. The space is required as a safety margin in a pond or basin.

Grade - A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein. **(To) Grade** - to finish the surface of a roadbed, top of embankment or bottom of excavation.

Grassed Waterway - A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from cropland.

Groundwater Recharge - Replenishment of existing natural underground water supplies.

HEC-HMS Model Calibrated - (Hydrologic Engineering Center Hydrologic Modeling System) A computer-based hydrologic model technique adapted to the Spring Creek and Paxton Creek Watershed for the Act 167 Plan. The model has been calibrated by adjusting key model input parameters.

High Quality Waters - Surface water having quality, which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying Pennsylvania Code Title 25 Environmental Protection, Chapter 93 Water Quality Standards 93.4b(a).

Hydrologic Soil Group (HSG) - Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The Natural Resources Conservation Service (NRCS) of the US Department of Agriculture defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of interest may be identified from a soil survey report, which can be obtained from local NRCS office or Dauphin County Conservation District office.

Impervious Surface (Impervious Area) - A surface that prevents the percolation of water into the ground. Impervious surface includes, but is not limited to: any roof, parking or driveway areas, and any new streets and sidewalks. Any surface areas designed to initially be gravel or crushed stone shall be assumed to be impervious surfaces.

Impoundment - A retention or detention basin designed to retain stormwater runoff and release it at a controlled rate.

Infiltration Structures - A structure designed to direct runoff into the ground (e.g. french drains, seepage pits, seepage trench).

Inlet - A surface connection to a closed drain. A structure at the diversion end of a conduit. The upstream end of any structure through which water may flow.

Karst - A type of topography or landscape characterized by depressions, sinkholes, limestone towers and steep-sided hills, underground drainage, and caves. Karst is formed on carbonate rocks, such as limestone or dolomites and sometimes gypsum.

Land Development - Development - (i) The improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving (a) a group of two or more buildings, or (b) the division or allocation of land or space between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups, or other features; (ii) Any subdivision of land; (iii) Development in accordance with Section 503(1.1) of the PA Municipalities Planning Code.

Land/Earth Disturbance - Any activity involving grading, tilling, digging, or filling of ground or stripping of vegetation or any other activity that causes an alteration to the natural condition of the land.

Main Stem (Main Channel) - Any stream segment or other runoff conveyance facility used as a reach in the Spring Creek and Paxton Creek watershed hydrologic model.

Manning Equation in (Manning formula) - A method for calculation of velocity of flow (e.g. feet per second) and flow rate (e.g. cubic feet per second) in open channels based upon channel shape, roughness, depth of flow and slope. "Open channels" may include closed conduits so long as the flow is not under pressure.

Minimum Separation Distance - The minimum distance between the discharge of runoff from impervious surfaces and the receiving stream, storm sewer, or property line, whichever is smaller,

whether the discharge is point or non-point. It is intended to provide ample, natural, undisturbed vegetated pervious areas to allow for infiltration of increased volumes of runoff.

Municipality, - The City of Harrisburg Dauphin County, Pennsylvania.

Nonpoint Source Pollution - Pollution that enters a water body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

NPDES - National Pollutant Discharge Elimination System, the federal government's system for issuance of permits under the Clean Water Act, which is delegated to DEP in Pennsylvania.

NRCS - Natural Resource Conservation Service (previously SCS).

Open Channel - A drainage element in which stormwater flows with an open surface. Open channels include, but shall not be limited to, natural and man-made drainage ways, swales, streams, ditches, canals, and pipes flowing partly full.

Outfall - (i) Point where water flows from a conduit, stream, or drain; (ii) "Point source" as described in 40 CFR § 122.2 at the point where the City's storm sewer system discharges to surface waters of the Commonwealth.

Outlet - Points of water disposal from a stream, river, lake, tidewater, or artificial drain.

Parking Lot Storage - Involves the use of impervious parking areas as temporary impoundments with controlled release rates during rainstorms.

Peak Discharge - The maximum rate of stormwater runoff from a specific storm event.

Person - An individual, partnership, public or private association or corporation, or a governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties.

Pipe - A culvert, closed conduit, or similar structure (including appurtenances) that conveys stormwater.

Planning Commission - The planning commission of The City of Harrisburg.

PMF (Probable Maximum Flood) - The flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in any area. The PMF is derived from the probable maximum precipitation (PMP) as determined on the basis of data obtained from the National Oceanographic and Atmospheric Administration (NOAA).

Point Source - Any discernible, confined, or discrete conveyance, including, but not limited to: any pipe, ditch, channel, tunnel, or conduit from which stormwater is or may be discharged, as defined in State regulations at 25 Pa. Code § 92.1.

Project Site - The specific area of land where any Earth Disturbance activities in the City are planned, conducted, or maintained.

Qualified Professional - A Professional Engineer licensed by the Pennsylvania Department of State, and other persons licensed or otherwise qualified by law to perform the work required by the Ordinance.

Rational Formula - A rainfall-runoff relation used to estimate peak flow.

Redevelopment - Earth disturbance activities on land, which has previously been disturbed or developed.

Regulated Activities - Actions or proposed actions that impact upon proper management of stormwater runoff and that are governed by this Ordinance as specified in 9-935 of this Ordinance.

Release Rate - The percentage of pre-development peak rate of runoff from a site or subwatershed area to which the post-development peak rate of runoff must be reduced to protect downstream areas.

Release Rate District - Those subwatershed areas in which some type of detention is required to meet the plan requirements and the goals of Act 167.

Retention Basin - An impoundment in which stormwater is stored and not released during the storm event. Stored water may be released from the basin at some time after the end of the storm.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to recur. For example, the 25-year return period rainfall would be expected to recur on the average once every twenty-five years.

Riser - A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified design storm.

Road Maintenance - Earth disturbance activities within the existing road cross-section, such as grading and repairing existing unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches, and other similar activities.

Rooftop Detention - Temporary ponding and gradual release of stormwater falling directly onto flat roof surfaces by incorporating controlled-flow roof drains into building designs.

Runoff - Any part of precipitation that flows over the land surface.

Runoff Capture Volume - The volume of runoff that is captured (retained) and not released into surface waters of the Commonwealth during or after a storm event.

Sediment Basin - A barrier, dam, retention or detention basin located and designed to retain rock, sand, gravel, silt, or other material transported by water.

Sediment Pollution - The placement, discharge or any other introduction of sediment into the waters of the Commonwealth occurring from the failure to design, construct, implement or maintain control measures and control facilities in accordance with the requirements of this Ordinance.

Sedimentation - The process by which mineral or organic matter is accumulated or deposited by the movement of water.

Seepage Pit/Seepage Trench - An area of excavated earth filled with loose stone or similar coarse material, into which surface water is directed for infiltration into the ground.

Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, City streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) primarily used for collecting and conveying stormwater runoff.

Sheet Flow - Runoff that flows over the ground surface as a thin, even layer, not concentrated in a channel.

Soil-Cover Complex Method - A method of runoff computation developed by the NRCS that is based on relating soil type and land use/cover to a runoff parameter called Curve Number (CN).

Spillway (emergency) - A depression in the embankment of a pond or basin that is used to pass peak discharge greater than the maximum design storm controlled by the pond.

State Water Quality Requirements - As defined under state regulations -- protection of *designated* and *existing* uses (See 25 Pa. Code Chapters 93 and 96)--including:

- (1) Each stream segment in Pennsylvania has a “designated use,” such as “cold water fishery” or “potable water supply,” which are listed in Chapter 93. These uses must be protected and maintained, under state regulations.
- (2) “Existing uses” are those attained as of November 1975, regardless whether they have been designated in Chapter 93. Earth Disturbance activities must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.
- (3) Water quality involves the chemical, biological, and physical characteristics of surface water bodies. After Earth Disturbance activities are complete, these characteristics can be impacted by addition of pollutants such as sediment, and changes in habitat through increased flow volumes and/or rates as a result of changes in land surface area from those activities. Therefore, permanent discharges to surface waters must be managed to protect the stream bank, streambed, and structural integrity of the waterway, to prevent these impacts.
- (4) Protection and maintenance of water quality in special protection streams pursuant to 25 Pa.Code Chapter 93.

Storage Indication Method - A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage) with outflow defined as a function of storage volume and depth.

Storm Frequency - The number of times that a given storm "event" occurs or is exceeded on the average in a stated period of years. See "Return Period".

Storm Sewer - A system of pipes and/or open channels that convey intercepted runoff and stormwater from other sources, but excludes domestic sewage and industrial wastes.

Stormwater - The surface runoff generated by precipitation reaching the ground surface.

Stormwater Hotspot - A stormwater hotspot is defined as a land use or activity that generates higher concentrations of hydrocarbons, trace metals, or toxicants than are found in typical stormwater runoff, based on monitoring studies.

Stormwater Management Facilities - Any structure, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects stormwater runoff. Typical stormwater management facilities include, but are not limited to, detention and retention basins, open channels, storm sewers, pipes and infiltration structures.

Stormwater Management Plan - The plan for managing stormwater runoff in the Spring Creek and Paxton Creek Watershed adopted by Dauphin County as required by the Act of October 4, 1978, P.L. 864, (Act 167) and known as the “Spring Creek Watershed Act 167 Stormwater Management Plan Phase II Update” or “Paxton Creek Watershed Act 167 Stormwater Management Plan Phase II Update”.

Stream Enclosure - A bridge, culvert, or other structure in excess of 100 feet in length upstream to downstream which encloses a regulated water of this Commonwealth.

Subwatershed Area - The smallest drainage unit of a watershed for which stormwater management criteria have been established in the Stormwater Management Plan.

Subdivision - The division or re-division of a lot, tract, or parcel of land by any means into two or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, transfer of ownership, or building or lot development: Provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than ten acres, not involving any new street or easement of access or any residential dwellings, shall be exempt.

Surface Waters of the Commonwealth - Any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface water, or parts thereof, whether natural or artificial, within or on the boundaries of the Commonwealth.

Swale - A low-lying stretch of land that gathers or carries surface water runoff.

Timber Operations - See “Forest Management”.

Time of Concentration (T_c) - The time for surface runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. This time is the combined total of overland flow time and flow time in pipes or channels, if any.

Watercourse - A channel or conveyance of surface water, such as a stream or creek, having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

Watershed - Region or area drained by a river, watercourse, or other body of water, whether natural or artificial.

Wetland - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs and similar areas. (The term includes but is not limited to wetland areas listed in the State Water Plan, the United States Forest Service Wetlands Inventory of Pennsylvania, the Pennsylvania Coastal Zone Management Plan and a wetland area designated by a river basin commission. This definition is used by the United States Environmental Protection Agency and the United States Army Corps of Engineers.)

ARTICLE III – STORMWATER MANAGEMENT

9-906 General Requirements

- (a) All Regulated Activities in the Spring Creek and Paxton Creek Watershed, which are not granted an exemption in accordance with the provisions of this Ordinance, shall submit a Drainage Plan consistent with the Spring Creek and Paxton Creek Watershed Stormwater Management Plan to the City for review. These criteria shall apply to the total proposed development even if development is to take place in stages. Impervious cover shall include, but not be limited to: additional indoor living space, decks, patios, garages, storage sheds and similar structures, roofs, parking or driveway areas, and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious.
- (b) All Regulated Activities within the City shall be designed, implemented, operated, and maintained to meet the purposes of this Ordinance, through these three elements:
 - (1) Erosion and sediment control during the earth disturbance activities (e.g., during construction),
 - (2) Water quality protection measures after completion of earth disturbance activities (e.g., post- construction), including operations and maintenance, and
 - (3) Drainage and Stormwater Management
- (c) No Earth Disturbance activities associated with any Regulated Activities shall commence until approval by the City of a plan, which demonstrates compliance with the requirements of this Ordinance.
- (d) All BMPs used to meet the requirements of this Ordinance shall be designed, installed, operated, and maintained to conform to the State Water Quality Requirements, the requirements of the Clean Streams Law and implementing regulations, and any more stringent requirements as determined by the City.
- (e) Stormwater drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by stormwater management facilities or open channels consistent with this Ordinance.
- (f) The existing points of concentrated drainage that discharge onto adjacent property shall not be altered without permission of the altered property owner(s) and shall be subject to any applicable discharge criteria specified in this Ordinance.
- (g) Areas of existing diffused drainage discharge shall be subject to any applicable discharge criteria in the general direction of existing discharge, whether proposed to be concentrated or maintained as diffused drainage areas, except as otherwise provided by this Ordinance. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the Developer must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding, or other harm will result from the concentrated discharge.

- 683 (h) Where watercourses traverse a development site, drainage easements shall be provided
684 conforming to the line of such watercourses. The terms of the easement shall prohibit
685 excavation, the placing of fill or structures, and any alterations that may adversely affect the flow
686 of stormwater within any portion of the easement. Also, maintenance, including mowing of
687 vegetation within the easement shall be required, except as approved by the appropriate
688 governing authority.
- 690 (i) When it can be shown that, due to topographic conditions, natural drainageways on the site
691 cannot adequately provide for drainage, open channels may be constructed conforming
692 substantially to the line and grade of such natural drainage ways. Work within natural drainage
693 ways shall be subject to approval by DEP under regulations at 25 Pa. Code Chapter 105 through
694 the Joint Permit Application process, or where deemed appropriate by DEP, through the General
695 Permit process.
- 697 (j) Any stormwater management facilities regulated by this Ordinance that would be located in or
698 adjacent to waters of the Commonwealth or wetlands shall be subject to approval by DEP under
699 regulations at 25 Pa. Code Chapter 105 through the Joint Permit Application process, or where
700 deemed appropriate by DEP, the General Permit process. When there is a question whether
701 wetlands may be involved, it is the responsibility of the Developer or his agent to show that the
702 land in question cannot be classified as wetlands; otherwise, approval to work in the area must
703 be obtained from DEP.
- 705 (k) Culverts, bridges, storm sewers, or any other facilities which must pass or convey flows from the
706 tributary area and any facility which may constitute a dam subject to permit by DEP under
707 regulations at 25 Pa. Code Chapter 105.
- 708 (l) All Earth Disturbance activities are subject to permit requirements by DEP under regulations at
709 25 Pa. Code Chapter 102.
- 711 (m) Any stormwater management facilities regulated by this Ordinance that would be located on
712 State highway rights-of-way shall be subject to approval by the Pennsylvania Department of
713 Transportation (PENNDOT).
- 715 (n) Minimization of impervious surfaces and infiltration of runoff through seepage beds, infiltration
716 trenches, etc. are encouraged, where soil conditions permit, to reduce the size or eliminate the
717 need for detention facilities.
- 719 (o) Roof drains shall not be connected to streets, sanitary or storm sewers, or roadside ditches in
720 order to promote overload flow and infiltration/percolation of stormwater where advantageous to
721 do so. When it is more advantageous to connect directly to streets or storm sewers, then the City
722 shall permit it on a case-by-case basis.
- 724 (p) Developers are encouraged to incorporate designs to take advantage of the stormwater credits
725 presented in Appendix E of the Spring Creek and Paxton Creek Act 167 Stormwater
726 Management Plan.
- 728 (q) Special Conditions for Areas Falling within Defined Exceptional Value and High Quality Sub-
729 Watersheds – The temperature and quality of water and streams that have been declared as
730 exceptional value and high quality is to be maintained as defined in Chapter 93, Water Quality
731 Standards, Title 25 of Pennsylvania Department of Environmental Protection Rules and

Regulations. Temperature sensitive BMPs and stormwater conveyance systems are to be used and designed with storage pool areas and supply outflow channels and should be shaded with trees. This will require modification of berms for permanent ponds and relaxation of restrictions on planting vegetation within the facilities, provided the capacity for volumes and rate controls is maintained. At a minimum, the southern half on pond shorelines will be planted with shade or canopy trees within ten (10) feet of the pond shoreline. In conjunction with this requirement, the maximum slope allowed on the berm area to be planted is 10 to 1. This will lessen the destabilization of berm soils due to root growth. A long term maintenance schedule and management plan for the thermal control BMPs is to be established and recorded for all development sites.

- (r) Techniques described in Appendix B (Low Impact Development) of this Ordinance are encouraged because they reduce the costs of complying with the requirements of this Ordinance and the State Water Quality Requirements.
- (s) Infiltration for storm water management is encouraged where soils and geology permit, consistent with the provisions of this Ordinance and, where appropriate, infiltration is encouraged for capturing and treating the Water Quality Volume (as calculated in 9-907), any part of the Water Quality Volume or for otherwise meeting the purposes of this Ordinance.
- (t) The City may, after consultation with DEP, approve alternative methods for meeting the State Water Quality Requirements other than those in Article III, provided that they meet the minimum requirements of, and do not conflict with, State law including but not limited to the Clean Streams Law.
- (u) The Drainage Plan for all developments that create impervious surface or change the existing topography, except for exemptions provided in 9-907, shall demonstrate that adequate capacity will be provided to treat the "Runoff Capture Volume" and contain the "Water Quality Volume", as described under 9-907 of this ordinance.

9-907 Exemptions

- (a) Two exemptions (**Exemption 1 - Release Rates, Water Quality Volume, Channel Protection Volume, and Drainage Plan Submission** and **Exemption 2 - Groundwater Recharge**) from this Ordinance may be granted at the discretion of the City. The Applicant must demonstrate that the following BMPs are being utilized to the maximum extent practicable to receive consideration for the two exemptions:
 - (1) Design around and limit disturbance of Floodplains, Wetlands, and Natural Slopes over 15%, existing native vegetation, and other sensitive and special value features
 - (2) Clearly show limits of disturbance on construction plans
 - (3) Maintain riparian and forested buffers
 - (4) Limit grading and maintain non-erosive flow conditions in natural flow paths
 - (5) Maintain existing tree canopies near impervious areas
 - (6) Minimize soil disturbance and reclaim disturbed areas with top soil and vegetation
 - (7) Direct runoff to pervious areas
 - (8) Utilize "Stormwater Credits" found in Appendix E of the Spring Creek and Paxton Creek Act 167 Plan
 - (9) Utilize guidance listed in the Pennsylvania Stormwater Best Management Practices Manual

(A) **Exemption 1 - Release Rates, Water Quality Volume, Channel Protection Volume, & Drainage Plan Submission** – An exemption of these requirements contained within this Ordinance for all Regulated Activities within the City may be granted at the discretion of the City in accordance with the following:

An exemption of Release Rates, Water Quality Volume, Channel Protection Volume, & Drainage Plan Submission may be granted in accordance with Table 1 to determine the maximum additional impervious area (and associated minimum separation distance) that can be placed on a development site. This exemption shall be granted only if the City determines that proposed development/additional impervious area will not adversely impact the following:

- (i) Capacities of existing drainage ways and storm sewer systems
- (ii) Velocities and erosion
- (iii) Quality of runoff if direct discharge is proposed
- (iv) Existing known problem areas
- (v) Safe conveyance of the additional runoff
- (vi) Harm or property damage to downstream property owners

Development that is planned to occur in stages or phases will be considered in its entirety for the purposes of determining the exemption.

Table 1

Parcel Size * (acres)	Minimum Separation Distance - (feet)	Maximum Additional Impervious Area - Since The Date of Adoption of This Ordinance - (square feet)
0.5	10	2,700
1.0	50	4,600
1.5	100	6,200
2.0	125	7,600
2.5	150	9,000
3.0	175	10,300
3.5	200	11,500
4.0	225	12,700
4.5	250	13,800
5.0	275	15,000
> 5.0	300	15,000

* Parcel Size to be rounded to the nearest half-acre for the purpose of utilizing Table 1

(B) **Exemption 2 - Groundwater Recharge** – An exemption of this requirement for all Regulated Activities within the City may be granted at the discretion of the City in accordance with the following:

An exemption of Groundwater Recharge may be granted if the maximum additional impervious coverage is **2,000 square feet or less**. Development sites that generate greater than 2,000 square feet of new impervious cover are not eligible for this exemption. The 2,000 square foot maximum additional impervious cover applies to the

total amount of additional impervious cover to be placed on a development site whether the project is a single phase or will occur in multiple phases. It does not include existing impervious cover placed on a development site prior to the adoption of this Ordinance.

An exemption of Groundwater Recharge may be granted if the City, based upon data provided by the Applicant, determines that the Groundwater Recharge requirements are not suitable in the following areas.

- (i) High groundwater table
 - o (Need minimum of 3 ft from bed of infiltration facility to seasonal high groundwater elevation)
- (ii) Shallow depth to bedrock
 - o (Need minimum of 2 ft from bed of infiltration facility to top of bedrock)
- (iii) High risk of sinkhole development, to be determined on a case-by-case basis

(b) At the discretion of the City, the Applicant may be required to provide a detailed geotechnical evaluation.

(c) Under no circumstance shall the Applicant be exempt from implementing such measures as necessary to:

- (i) Meet State Water Quality Standards/Requirements
- (ii) Protect health, safety, and property
- (iii) Meet special requirements for High Quality (HQ) and Exceptional Value (EV) Watersheds.

9-908 Stormwater Management Districts

(a) The Spring Creek Watershed has been designated into six (6) release rate districts as shown (Plate 5). All areas within the districts are subject to the specified release rates. The 2-year, 10-year, and the 25-year design storms are all subject to specified release rates. The Paxton Creek Watershed has been designated into forty-five (45) subwatersheds as shown on Page 6 of this ordinance (Plate 6 in the Plan). All areas within the districts are subject to the specified release rates. The 2-year, 10-year, and 25-year design storms are all subject to the specified release rates.

(b) Any areas not shown on the release rate maps, the post-development discharge rates shall not exceed the predevelopment discharge rates.

(c) If the developer can show that the post-development hydrograph matches the pre-development hydrograph for peak flows and volume, for all design storms, release rates, as described in 9-908(a) are not required.

9-909 Stormwater Management District Implementation Provisions

(a) Off-Site Areas - Off-site areas that drain through a proposed development site are not subject to release rate criteria when determining allowable peak runoff rates. However, on-site drainage facilities shall be designed to safely convey off-site flows through the development site.

(b) "No Harm" Option - For any proposed development site, the developer has the option of using a less restrictive runoff control (including no detention), if the developer can prove that "no harm" would be caused by discharging at a higher runoff rate than existing conditions. The "no harm" option is used when a developer can prove that the post-development hydrographs can match pre-development hydrographs, or if it can be proven that the post-development conditions will not cause increases in peaks at all points downstream. Proof of "no harm" would have to be shown based upon a "Downstream Impact Evaluation" which shall include a "Downstream Hydraulic Capacity Analysis" consistent with 9-909(c) to determine if adequate hydraulic capacity exists. The developer shall submit this evaluation of the impacts due to increased downstream stormwater flows in the watershed to the City.

- (1) The "Downstream Impact Evaluation" shall include hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications due to the proposed development upon a dam, highway, structure, natural point of restricted stream flow, or any stream channel section, established with the concurrence of the City.
- (2) The evaluation shall continue downstream until the increase in flow diminishes due to additional flow from tributaries and/or stream attenuation.
- (3) The peak flow values to be used for downstream areas for the design return period storms (2-year, 10-year, and 25-year) shall be the values from the calibrated model for the Spring Creek and Paxton Creek watershed. These flow values can be obtained from the watershed plan.
- (4) Developer-proposed runoff controls which would generate increased peak flow rates at storm drainage problem areas would, by definition, be precluded from successful attempts to prove "no harm", except in conjunction with proposed capacity improvements for the problem areas consistent with 9-909(c).
- (5) A financial distress shall not constitute grounds for granting a "no harm" exemption.
- (6) Capacity improvements may be provided as necessary to implement the "no harm" option, which proposes specific capacity improvements to demonstrate that a less stringent discharge control would not create any harm downstream.
- (7) Any "no harm" justifications shall be submitted by the Developer as part of the Drainage Plan submission per Article IV.

(c) "Downstream Hydraulic Capacity Analysis" - Any downstream capacity hydraulic analysis conducted in accordance with this Ordinance shall use the following criteria for determining adequacy for accepting increased peak flow rates:

- (1) Natural or man-made channels or swales must be able to convey the increased runoff associated with a 2-year return period event within their banks at velocities consistent with protection of the channels from erosion. Acceptable velocities shall be based upon criteria included in the DEP *Erosion and Sediment Pollution Control Program Manual*.
- (2) Natural or man-made channels or swales must be able to convey the increased 25-year return period runoff without creating any hazard to persons or property.

- (3) Culverts, bridges, storm sewers, or any other facilities which must pass or convey flows from the tributary area must be designed in accordance with DEP, Chapter 105 regulations (if applicable) and, at a minimum, pass the increased 25-year return period runoff.

- (d) Regional Detention Alternatives - For certain areas within the watershed, it may be more cost-effective to provide one control facility for more than one development site than to provide an individual control facility for each development site. The initiative and funding for any regional runoff control alternatives are the responsibility of prospective developers. The design of any regional control basins must incorporate reasonable development of the entire upstream watershed. The peak outflow of a regional basin would be determined on a case-by-case basis using the hydrologic model of the watershed consistent with protection of the downstream watershed areas. "Hydrologic model" refers to the calibrated model as developed for the Stormwater Management Plan.

9-910 Design Criteria for Stormwater Management Facilities

- (a) Any stormwater management facility (i.e. detention basin) designed to store runoff and requiring a berm or earthen embankment, required or regulated by this Ordinance, shall be designed to provide an emergency spillway to handle flow up to and including the 100-year post-development conditions. The height of embankment must be set as to provide a minimum 1-foot of freeboard above the maximum pool elevation computed when the facility functions for the 100-year post-development inflow. Soils used for the construction of basins shall have low-erodibility factors ("K" factors). Should any stormwater management facility require a dam safety permit under DEP Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety which may be required to pass storms larger than 100-year event.
- (b) Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures) and any work involving wetlands as directed in DEP Chapter 105 regulations (as amended or replaced from time to time by DEP) shall be designed in accordance with Chapter 105 and will require a permit from DEP. Any water obstruction that does not fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm with a minimum 1-foot of freeboard measured below the lowest point along the top of the roadway. Any facility that constitutes a dam as defined in DEP Chapter 105 regulations may require a permit under dam safety regulations. Any facility located within a PENNDOT right-of-way must meet PENNDOT minimum design standards and permit submission requirements.
- (c) Storm sewers and manmade channels (i.e. swales) must be able to convey post-development runoff from a 10-year design storm without surcharging inlets where appropriate. When connecting to an existing storm sewer system, the Applicant must demonstrate that the proposed system will not exacerbate any existing stormwater problems.
- (d) Adequate erosion protection shall be provided along all open channels and at all points of discharge.
- (e) The design of all stormwater management facilities shall incorporate sound engineering principles and practices. The City shall reserve the right to disapprove any design that would

result in the occupancy or continuation of an adverse hydrologic or hydraulic condition within the watershed.

9-911 Calculation Methodology

(a) Stormwater runoff from all development sites shall be calculated using either the Rational Method or a Soil-Cover-Complex methodology.

(1) Any stormwater runoff calculations involving drainage areas greater than 20 acres, including on-and off-site areas, shall use a generally accepted calculation technique that is based on the NRCS soil cover complex method. Table 2 summarizes acceptable computation methods. It is assumed that all methods will be selected by the design professional based on the individual limitations and suitability of each method for a particular site.

The City may approve the use of the Rational Method to estimate peak discharges from drainage areas that contain less than 20 acres.

(2) The design storm volumes to be used in the analysis of peak rates of discharge may be obtained from the Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, US Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland (2004). NOAA's Atlas 14 can be accessed at Internet address: <http://hdsc.nws.noaa.gov/hdsc/pfds/>.

(3) All calculations consistent with this Ordinance using the Soil Cover Complex Method shall use the appropriate design rainfall depths for the various return period storms presented in Table A-1 in Appendix A of this Ordinance if Atlas 14 is not used. If a hydrologic computer model is used for stormwater runoff calculations, then the duration of rainfall shall be 24-hour along with a Soil Conservation Service Type II rainfall distribution.

(4) For the purposes of pre-development flow rate determination, undeveloped land shall be considered as "meadow" good condition or "range" unless the natural ground cover generates a lower curve number or Rational 'C' value (i.e. forest).

(5) All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times of concentration for overland flow and return periods from the Design Storm Curves from PA Department of Transportation Design Rainfall Curves (1986). Times of concentration for overland flow shall be calculated using the methodology presented in Chapter 3 of Urban Hydrology for Small Watersheds, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times of concentration for channel and pipe flow shall be computed using Manning's equation.

(6) For undeveloped areas, times of concentration may be computed using the SCS equation for Lag Time (T_{LAG}).

$$\text{Time of Concentration} = T_C = \frac{T_{LAG}}{0.6} * 60 \quad (\text{in minutes})$$

$$T_{lag} = L^{0.8} \frac{(S+1)^{0.7}}{1900\sqrt{Y}}$$

Where:

T_{lag} = Lag time in hours

L = Hydraulic length of watershed in feet.

Y = Average overland slope of watershed in percent.

S = Maximum retention in watershed as defined by:

$$S = \frac{1000}{CN} - 10$$

CN = SCS Curve Number for watershed as defined by the SCS Loss Method.

- (7) Runoff Curve Numbers (CN) for both existing and proposed conditions to be used in the soil cover complex method shall be obtained from Table A-2 in Appendix A of this Ordinance.
- (8) Runoff coefficients (C) for both existing and proposed conditions for use in the Rational Method shall be obtained from Table A-3 in Appendix A of this Ordinance.
- (9) Where uniform flow is anticipated, the Manning equation shall be used for hydraulic computations and to determine the capacity of open channels, pipes, and storm sewers. Values for Manning's roughness coefficient "n" shall be consistent with Table A-4 in Appendix A of the Ordinance. Manning's equation should not be used for analysis of pipes under pressure flow or for analysis of culverts.
- (10) The design of any stormwater detention facilities intended to meet the performance standards of this Ordinance shall be verified by routing the design storm hydrograph through these facilities using the Storage-Indication Method. For drainage areas greater than 20 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph.
- The City may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.
- (11) The City has the authority to require that computed existing runoff rates be reconciled with field observations and conditions. If the designer can substantiate through actual physical calibration that more appropriate runoff and time of concentration values should be utilized at a particular site, then appropriate variations may be made upon review and recommendations of the City. Calibration shall require detailed gauge and rainfall data for the particular site in question.
- (12) Outlet structures for stormwater management facilities shall be designed to meet the performance standards of this Ordinance using any generally accepted hydraulic analysis technique or method.

**TABLE 2 - ACCEPTABLE COMPUTATION METHODOLOGIES
FOR STORMWATER MANAGEMENT PLANS**

METHOD	METHOD DEVELOPED BY	APPLICABILITY
TR-20 or Commercial Package Based on TR-20	USDA - NRCS	When use of full model is desirable or necessary
TR-55 Or Commercial Package Based on TR-55	USDA - NRCS	Applicable for plans within the models limitations
HEC - HMS	U.S. Army Corps of Engineers	When full model is desirable or

		necessary
PSRM	Penn State University	When full model is desirable or necessary
Rational Method or Commercial Package based on Rational Method	Emil Kuiching (1889)	For sites less than 20-acres
Other Methods	Various	As approved by the City

Successors to the above methods also are acceptable. Such successors include HEC-HMS for HEC-1, WinTR55 for TR-55 and WinTR20 for TR-20.

9-912 Erosion and Sedimentation Requirements during Earth Disturbance Activities

- (a) No Earth Disturbance activities within the City shall commence until approval by the Dauphin County Conservation District of an Erosion and Sediment Control Plan for construction activities.
- (b) When five thousand (5,000) square feet or more of earth disturbance activities are proposed, an Erosion and Sedimentation Control Plan must be submitted to the Dauphin County Conservation District and the City under 25 Pa. Code § 102.4(b). In addition, a letter from the Dauphin County Conservation District approving the Erosion and Sedimentation Control Plan must be obtained.
- (c) DEP has regulations; under 25 Pa. Code Chapter 92 that a DEP “NPDES Construction Activities” permit is required and must be obtained from the Dauphin County Conservation District and/or PA Department of Environmental Protection for Earth Disturbance activities.
- (d) Evidence of any necessary permit(s) for Earth Disturbance activities from the South-central regional DEP office or Dauphin County Conservation District must be provided to the City.
- (e) A copy of the Erosion and Sediment Control Plan and any other permit, as required by DEP regulations, shall be available at the project site at all times.
- (f) Additional erosion and sedimentation control design standards and criteria that must be or are recommended to be applied where infiltration BMPs are proposed and include the following:
 - (i) Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase so as to maintain their maximum infiltration capacity.
 - (ii) Infiltration BMPs shall be protected from receiving sediment-laden runoff.

9-913 Water Quality Requirements after Earth Disturbance Activities Are Complete

- (a) No Earth Disturbance activities within the City shall commence, until approval by the City, of a plan, which demonstrates compliance with State Water Quality Requirements, after construction is complete.
- (b) The BMPs must be designed, implemented, and maintained to meet State Water Quality Requirements, and any other more stringent requirements as determined by the City.

(c) To control post-construction stormwater impacts from Earth Disturbance activities, State Water Quality Requirements can be met by a variety of BMPs, including site design, which provide for replication of pre-construction stormwater infiltration and runoff conditions, so that post-construction stormwater discharges do not degrade the physical, chemical, or biological characteristics of the receiving waters. As described in the DEP Comprehensive Stormwater Management Policy (#392-0300-002, September 28, 2002), this may be achieved by the following:

- (i) Ground Water Recharge/Infiltration: replication of pre-construction stormwater infiltration conditions,
- (ii) Water Quality Treatment: use of water quality treatment BMPs to ensure filtering out of the chemical and physical pollutants from the stormwater runoff, and
- (iii) Stream bank and Streambed Protection: management of volume and rate of post-construction stormwater discharges to prevent physical degradation of receiving waters (e.g., from scouring).

(d) DEP has regulations that require the City to ensure design, implementation, and maintenance of BMPs that control runoff from new development and redevelopment after Earth Disturbance activities are complete. These requirements include the need to implement post-construction stormwater BMPs with assurance of long-term operations and maintenance of those BMPs.

(e) Evidence of any necessary permit(s) for Earth Disturbance activities from the South-central DEP regional office must be provided to the City.

9-914 Ground Water Recharge (Infiltration/Recharge/Retention)

(a) The ability to retain and maximize the ground water recharge capacity of the area being developed or redeveloped is encouraged. Design of the infiltration/recharge stormwater management facilities shall give consideration to providing ground water recharge to compensate for the reduction in the percolation that occurs when the ground surface is paved and roofed over. These measures are encouraged, particularly in hydrologic soil groups A and B, and shall be utilized wherever feasible.

(b) The criteria for maintaining recharge is based on the USDA average annual recharge volume per soil type divided by the annual rainfall in Dauphin County (41 inches per year) and multiplied by 90%. This keeps the recharge calculation consistent with the WQ_v methodology. Thus, an annual recharge volume requirement shall be specified for a site as follows:

Percent Volume Method

$$Re_v = [(S)(R_v)(A)]/12$$

Where: Re_v = Ground Water Recharge Volume (ac-ft)
 S = Soil Specific Recharge Factor
 $R_v = 0.05 + 0.009(I)$
 I = Percent Impervious Cover

(i.e. use I=20 when there is 20% impervious cover)
A = Site Area (acres)

Percent Area Method

$$Re_v = (S)(A_i)$$

Where: Re_v = Ground Water Recharge Volume (ac-ft)
S = Soil Specific Recharge Factor
 A_i = Measured Impervious Cover (acres)

<u>Hydrologic Soil Group</u>	<u>Soil Specific Recharge Factor (S)</u>
A	0.39
B	0.26
C	0.14
D	0.07

The recharge volume is considered part of the total WQ_v that must be provided at a site and can be achieved either by a structural practice (e.g., infiltration, bioretention), a non-structural practice (e.g., buffers, disconnection of rooftops) or a combination of both.

Drainage areas having no impervious cover and no proposed disturbance during development may be excluded from the Re_v calculations. Designers are encouraged to use these areas as non-structural practices for Re_v Treatment.

Note: Re_v and WQ_v are inclusive. When treated separately, the Re_v may be subtracted from the WQ_v when sizing the water quality BMP.

(c) **Basis for Determining Recharge Volume**

- (1) Developers are encouraged to incorporate designs to take advantage of the storm water credits presented in Appendix E of the Spring Creek and Paxton Creek Act 167 Stormwater Management Plan.
- (2) If more than one HSG is present at a site, a composite soil-specific recharge factor shall be computed based on the proportion of total site area within each HSG. The recharge volume provided at the site shall be directed to the most permeable HSG available.
- (3) The “Percent Volume” method is used to determine the Re_v Treatment requirement when structural practices are used to provide recharge. These practices must provide see page into the ground and may include infiltration and exfiltration structures (e.g., infiltration bioretention, dry swales or sand filters with storage below the under drain). Structures that require impermeable liners, intercept groundwater or are designed for trapping sediment (e.g., forbays) may not be used. In this method, the volume of runoff treated by structural practices shall meet or exceed the computed recharge volume.
- (4) The “Percent Area” method is used to determine the Re_v Treatment requirements when non-structural practices are used. Under this method, the recharge requirements are evaluated by mapping the percent of impervious area that is effectively treated by an

acceptable non-structural practice and comparing it to the minimum recharge requirements.

(5) Acceptable non-structural practices include filter strips that treat rooftop or parking lot runoff, sheet flow discharge to stream buffers, and grass channels that treat roadway runoff.

(6) The recharge volume criterion does not apply to any portion of a site designated as a stormwater hotspot or any project considered as redevelopment. In addition, the City may alter or eliminate the recharge volume requirement if the site is situated on unsuitable soils (e.g., marine clays, karst or in an urban redevelopment area). In this situation, non-structural practices (Percent Area Method) shall be implemented to the maximum extent practicable and the remaining or untreated Re_v included in the WQ_v treatment.

(7) If Re_v is treated by structural or non-structural practices separate and upstream of the WQ_v treatment, the WQ_v is adjusted accordingly.

(d) Soils Evaluation

(1) A detailed soils evaluation of the project site shall be performed to determine the suitability of recharge facilities. The evaluation shall be performed by a qualified professional and, at a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, subgrade stability, hydrologic soil groups and natural and manmade features.

(2) Extreme caution shall be exercised where infiltration is proposed in geologically susceptible areas such as strip mine or limestone areas. Extreme caution shall also be exercised where salt or chloride would be a pollutant since soils do little to filter this pollutant and it may contaminate the groundwater. It is also extremely important that the design professional evaluate the possibility of groundwater contamination from the proposed infiltration/recharge facility and recommend a hydrogeologic justification study be performed if necessary. Whenever a basin will be located in an area underlain by limestone, a geological evaluation of the proposed location shall be conducted to determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent ground water contamination and, where necessary, sinkhole formation.

(3) The City may require the installation of an impermeable liner in detention basins. A detailed hydrogeologic investigation may be required by the City. The City shall require the developer to provide safeguards against groundwater contamination for uses that may cause groundwater contamination, should there be a mishap or spill.

(4) It shall be the developer's responsibility to verify if the site is underlain by limestone. The following note shall be attached to all Drainage Plans and signed and sealed by the developer's engineer/surveyor/landscape architect/geologist:

I, _____, certify that the proposed detention basin (circle one) is/is not underlain by limestone.

- (5) Where pervious pavement is permitted for parking lots, recreational facilities, non-dedicated streets or other areas, pavement construction specifications shall be noted on the plan.
- (6) Recharge/infiltration facilities may be used in conjunction with other innovative or traditional BMPs, stormwater control facilities and nonstructural stormwater management alternatives.
- (7) All recharge/infiltration facilities shall be designed to completely drain surface water within 48 hours from the end of the storm.
- (8) Provide field test to determine appropriate percolation rate.
- (9) Design infiltration structures for required storm volume based on field-determined capacity at the level of the proposed infiltration surface.
- (10) Whenever a basin is proposed over an area underlain by limestone, the Drainage Plan shall include an evaluation of the susceptibility to sinkhole formation.
- (11) The developer is responsible to provide adequate measures to protect the quality of water resources.
- (12) When infiltration structures are used, the area where the structure is to be constructed and associated soils shall be protected from compaction.

9-915 Water Quality Requirements

- (a) In addition to the performance standards and design criteria requirements of this Ordinance, the land developer shall comply with the following water quality requirements unless otherwise exempted by provisions of this Ordinance.
- (b) For water quality, the objective is to provide adequate storage to capture and treat the runoff from 90% of the average annual rainfall. P represents the depth of rain associated with 90% of the total rainfall events over 0.11 inches. Trace amounts of precipitation under 0.11 inches were disregarded to determine the 90% storm.

- (1) The size of the water quality facility shall be based upon the following equation:

$$WQ_v = [(P) (R_v)(A)]/12$$

Where:

WQ_v	= Water Quality Volume (acre-feet)
P	= 1.1 inches of rainfall
R_v	= $0.05 + 0.009(I)$
I	= Percent Impervious Cover (i.e. use $I=20$ when there is 20% impervious cover)
A	= Site Area (acres)

- 1295 (2) Treatment of the WQ_v shall be provided at all developments where stormwater
1296 management is required. A minimum WQ_v of 0.2 acre-inches shall be met at
1297 sites or in drainage areas that have less than 15% impervious cover.
1298
- 1299 (3) Drainage areas having no impervious cover and no proposed disturbance during
1300 development may be excluded from the WQ_v calculations. Designers are
1301 encouraged to maximize the use of these areas as non-structural practices for WQ_v
1302 treatment.
1303
- 1304 (4) The design of the facility shall consider and minimize the chances of clogging and
1305 sedimentation potential. Orifices smaller than 3 inches diameter are not
1306 recommended. However, if the Design Engineer can provide proof that the
1307 smaller orifices are protected from clogging by use of trash racks, etc., smaller
1308 orifices may be permitted.
1309
- 1310 (5) Developers are encouraged to incorporate designs to take advantage of the
1311 stormwater credits presented in Appendix E of the Spring Creek and Paxton
1312 Creek Act 167 Stormwater Management Plan.
1313
- 1314 (c) To accomplish 9-914, the land developer may submit original and innovative designs to the
1315 City for review and approval. Such designs may achieve the water quality objectives
1316 through a combination of BMPs.
1317
- 1318 (d) In selecting the appropriate BMPs or combinations thereof, the land developer shall consider
1319 the following:
1320
- 1321 (1) Total contributing area
 - 1322 (2) Permeability and infiltration rate of the site soils
 - 1323 (3) Slope and depth to bedrock
 - 1324 (4) Seasonal high water table
 - 1325 (5) Proximity to building foundations and wellheads
 - 1326 (6) Erodibility of soils
 - 1327 (7) Land availability and configuration of the topography
1328
- 1329 (e) The following additional factors should be considered when evaluating the suitability of BMPs
1330 used to control water quality at a given development site:
1331
- 1332 (1) Peak discharge and required volume control
 - 1333 (2) Stream bank erosion
 - 1334 (3) Efficiency of the BMPs to mitigate potential water quality problems
 - 1335 (4) The volume of runoff that will be effectively treated
 - 1336 (5) The nature of the pollutant being removed
 - 1337 (6) Maintenance requirements
1338
1339
- 1340 **9-916 Stream Bank Protection Requirements**
1341
- 1342 (a) Stream bank protection shall be considered in implementing performance standards. If a
1343 stormwater storage facility needs to be constructed then, to protect channels from erosion, the
1344 outflow structure shall be designed to provide the 24-hour detention of the 1-year, 24-hour storm

event. The method for determining the Channel Protection Storage Volume (C_{pv}) requirement is detailed in Appendix D of this Ordinance.

(b) Basis for Determining Channel Protection Storage Volume, C_{pv} :

- (1) The models HEC-HMS, TR-55 and TR-20 (or an equivalent approved by the City) shall be used for determining peak discharge rates.
- (2) Rainfall depth for the 1-year, 24-hour storm event in Dauphin County is 2.5 inches.
- (3) Off-site areas shall be modeled as present land use in good condition for the 1-year storm event.
- (4) The length of overland flow used in time of concentration (t_c) calculations is limited to no more than 150-feet.
- (5) C_{pv} is not required at sites where the one-year post-development peak discharge (q_i) is less than or equal to 2.0 cfs. A C_{pv} orifice diameter (d_o) of less than 3 inches is subject to approval by the City and is not recommended unless an internal control for orifice protection is used.
- (6) C_{pv} shall be addressed for the entire site. If a site consists of multiple drainage areas, C_{pv} shall be computed and provided for each drainage area.
- (7) Extended detention storage provided for the C_{pv} does not meet the WQ_v requirement (i.e., C_{pv} and WQ_v shall be treated separately).
- (8) The stormwater storage needed for the C_{pv} may be provided above the WQ_v storage in stormwater ponds and wetlands, thereby meeting all storage criteria except Re_v in a single facility with appropriate hydraulic control structures for each storage requirement.
- (9) Infiltration is not recommended for C_{pv} control because of large storage requirements.

ARTICLE IV-DRAINAGE PLAN REQUIREMENTS

9-917 General Requirements

- (a) For any of the Regulated Activities by this Ordinance and not eligible for the exemptions provided in 9-907, the final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, or the commencement of any land disturbance activity may not proceed until the Property Owner or Developer or his/her agent has received written approval of a Drainage Plan from the City.

9-918 Drainage Plan Contents

- (a) The Drainage Plan shall consist of all applicable calculations, maps, and plans. A note on the maps shall refer to the associated computations and erosion and sedimentation control plan by title and date. The cover sheet of the computations and erosion and sedimentation control plan shall refer to the associated maps by title and date. All Drainage Plan materials shall be submitted to the City in a format that is clear, concise, legible, neat and well organized; otherwise, the Drainage Plan shall be disapproved and returned to the Applicant.

- 1397 (b) The following items shall be included in the Drainage Plan:
1398
1399 (1) General
1400
1401 (A) General description of project.
1402
1403 (B) The name, location and address of the property site; the name, address,
1404 and telephone number of the owner of the property; and the name, address,
1405 telephone number, and email address of the individual or firm
1406 preparing the Drainage Plan.
1407
1408 (C) General description of permanent stormwater management techniques,
1409 including: construction specifications of the materials to be used for
1410 stormwater management facilities, how each permanent stormwater BMP
1411 will be operated and maintained, and the identity of the person(s)
1412 responsible for operations and maintenance.
1413
1414 (D) Complete hydrologic, hydraulic and structural computations for all
1415 stormwater management facilities.
1416
1417 (2) Map(s) of the project area shall be submitted on 24-inch x 36-inch or 30-inch x 42-inch
1418 sheets and shall be prepared in a form that meets the requirements for recording in the
1419 offices of the Recorder of Deeds of Dauphin County. The contents of the maps(s) shall
1420 include, but not be limited to:
1421
1422 (A) The location of the project relative to highways, Cities or other
1423 identifiable land marks.
1424
1425 (B) Existing contours at intervals of two feet. In areas of steep slopes (greater
1426 than 15%), five-foot contour intervals may be used.
1427
1428 (C) Existing water bodies within the project area including streams, lakes,
1429 ponds, field delineated wetlands or other bodies of water.
1430
1431 (D) Other physical features including flood hazard boundaries, sinkholes,
1432 streams, existing drainage courses, areas of natural vegetation to be
1433 preserved and the total extent of the upstream area draining through the
1434 site.
1435
1436 (E) The locations of all existing and proposed utilities, sanitary sewers and
1437 water lines within 50 feet of property lines.
1438
1439 (F) An overlay showing soil names and boundaries.
1440
1441 (G) Proposed changes to the land surface and vegetative cover including the
1442 type and amount of impervious area that would be added.
1443
1444 (H) Proposed structures, roads, paved areas and buildings.
1445

- 1446 (I) Final contours at intervals of two feet. In areas of steep slopes (greater than
1447 an 15%), five-foot contour intervals may be used.
- 1448
- 1449 (J) The name of the development, the name and address of the owner of the
1450 property and the name of the individual or firm preparing the plan.
- 1451
- 1452 (K) The date of submission.
- 1453
- 1454 (L) A graphic and written scale of one inch equals no more than 50 feet; for tracts of 20 acres or more, the scale shall be one inch equals no more than
1455 100 feet.
- 1456
- 1457
- 1458 (M) A North arrow.
- 1459
- 1460 (N) The total tract boundary and size with distances marked to the nearest foot
1461 and bearings to the nearest degree.
- 1462
- 1463 (O) Existing and proposed land use(s).
- 1464
- 1465 (P) A key map showing all existing man-made features beyond the property
1466 boundary that would be affected by the project.
- 1467
- 1468 (Q) Horizontal and vertical profiles of all open channels, including hydraulic
1469 capacity.
- 1470
- 1471 (R) Overland drainage paths.
- 1472
- 1473 (S) A 15-foot wide access easement around all stormwater management
1474 facilities that would provide ingress to and egress from a public right-of-
1475 way. The 15 feet shall extend from the top of bank of any channel or berm
1476 of any basin.
- 1477
- 1478 (T) A note on the plan indicating the location and responsibility for
1479 maintenance of stormwater management facilities that would be located
1480 off-site. All off-site facilities shall meet the performance standards and
1481 design criteria specified in this Ordinance.
- 1482
- 1483 (U) A construction detail of any improvements made to sinkholes and the
1484 location of all notes to be posted as specified in this Ordinance.
- 1485
- 1486 (V) Design details for stormwater infiltration, water quality, and
1487 detention/retention facilities including operation and maintenance
1488 requirements.
- 1489
- 1490 (W) A statement, signed by the landowner, acknowledging that the stormwater
1491 BMPs are fixtures that cannot be altered or removed without prior
1492 approval by the City.
- 1493
- 1494 (X) The location and clear identification of the nature of permanent stormwater
1495 BMPs.

1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545

(Y) The following signature block for the City:

The City of Harrisburg, on this date (date of signature), has reviewed and hereby certifies that the Drainage Plan meets all design standards and criteria of the Spring Creek and Paxton Creek Watershed Act 167 Stormwater Management Ordinance.

(Z) The location of all erosion and sedimentation control facilities.

(3) Supplemental Information

(A) A written description of the following information shall be submitted.

(i) The overall stormwater management concept for the project.

(ii) Stormwater runoff computations as specified in this Ordinance.

(iii) Stormwater management techniques to be applied both during and after development.

(iv) Expected project time schedule.

(B) A soil erosion and sedimentation control plan, where applicable, including all reviews and approvals as required by DEP.

(C) A geologic assessment of the effects of runoff on sinkholes as specified in this Ordinance.

(D) The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing City stormwater collection system that may receive runoff from the project site.

(E) A Highway Occupancy Permit from the PENNDOT District Office when utilization of a PENNDOT storm drainage system is proposed.

(4) Stormwater Management Facilities

(A) All stormwater management facilities must be located on a plan and described in detail.

(B) When groundwater recharge methods such as seepage pits, beds or trenches are used, the locations of existing and proposed septic tank infiltration areas and wells must be shown.

(C) All calculations, assumptions, and criteria used in the design of the stormwater management facilities must be shown.

- (a) For all Regulated Activities by this Ordinance, the steps below shall be followed for submission. For any activities that require a DEP Joint Permit Application and regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of DEP's Rules and Regulations, require a PENNDOT Highway Occupancy Permit, or require any other permit under applicable state or federal regulations, the permit(s) shall be part of the plan.

(1) The Developer as part of the Preliminary Plan submission shall submit the Drainage Plan for the Regulated Activity.

(2) Four (4) copies of the Drainage Plan shall be submitted.

(3) Distribution of the Drainage Plan will be as follows:

(i) Two (2) copies to the City accompanied by the requisite City Review Fee, as specified in this Ordinance

(ii) One (1) copy to the City

(iii) One (1) copy to the County Planning Commission/Department

9-919 Drainage Plan Review

- (a) The City shall review the Drainage Plan for consistency with the purposes and requirements of this Ordinance. The City shall require receipt of a complete plan as specified in this Ordinance.
- (b) The City shall review the Drainage Plan for any subdivision or land development against the City subdivision and land development ordinance provisions not superseded by this Ordinance.
- (c) For Regulated Activities by this Ordinance, the City shall determine whether the Drainage Plan is consistent with the Stormwater Management Plan. Should the Drainage Plan be determined to be consistent with the Stormwater Management Plan, the City will forward an approval letter to the Developer.
- (d) Should the Drainage Plan be determined to be inconsistent with the Stormwater Management Plan, the City will forward a disapproval letter to the Developer citing the reason(s) for the disapproval. Any disapproved Drainage Plans may be revised by the Developer and resubmitted consistent with this Ordinance.
- (e) For Regulated Activities specified in 9-935 of this Ordinance, the City shall notify the City Building Permit Officer in writing, within a time frame consistent with the City Building Code and/or City Subdivision Ordinance, whether the Drainage Plan is consistent with the Stormwater Management Plan and forward a copy of the approval/disapproval letter to the Developer. Any disapproved rainage Plan may be revised by the Developer and resubmitted consistent with this Ordinance.
- (f) For Regulated Activities requiring a DEP Joint Permit Application, the City may notify DEP whether the Drainage Plan is consistent with the Stormwater Management Plan and forward a

copy of the review letter to the City and the Developer. DEP may consider the City's review comments in determining whether to issue a permit.

- (g) The City shall not approve any subdivision or land development for Regulated Activities specified in 9-935 of this Ordinance if the Drainage Plan has been found to be inconsistent with the Stormwater Management Plan, as determined by the City. All required permits from DEP must be obtained prior to approval.
- (h) The City Building Permit Office shall not issue a building permit for any Regulated Activity specified in 9-935 of this Ordinance if the Drainage Plan has been found to be inconsistent with the Stormwater Management Plan, as determined by the City, or without considering the comments of the City. All required permits from DEP must be obtained prior to issuance of a building permit.
- (i) The Developer may be responsible for completing an "As-Built Survey" of all stormwater management facilities included in the approved Drainage Plan. The As-Built Survey and an explanation of any discrepancies with the design plans shall be submitted to the City for final approval. In no case shall the City approve the As-Built Survey until the City receives a copy of an approved Highway Occupancy Permit from the PENNDOT District Office and any applicable permits from DEP.
- (j) The City's approval of a Drainage Plan shall be valid for a period not to exceed three (3) years. This time period shall commence on the date that the City signs the approved Drainage Plan. If stormwater management facilities included in the approved Drainage Plan have not been constructed, or if an As-Built Survey of these facilities has not been approved within this time period, then the City may consider the Drainage Plan disapproved and may revoke any and all permits. Drainage Plans that are considered disapproved by the City shall be resubmitted in accordance with 9-921 of this Ordinance.

9-920 Modification of Plans

- (a) A modification to a submitted Drainage Plan for a development site that involves a change in stormwater management facilities or techniques, or that involves the relocation or re-design of stormwater management facilities, or that is necessary because soil or other conditions are not as stated on the Drainage Plan as determined by the City, shall require a resubmission of the modified Drainage Plan consistent with 9-918 of this Ordinance and be subject to review as specified in 9-919 of this Ordinance.
- (b) A modification to an already approved or disapproved Drainage Plan shall be submitted to the City accompanied by the applicable review fee. A modification to a Drainage Plan for which the City has not taken a formal action shall be submitted to the City, accompanied by the applicable City Review Fee.

9-921 Resubmission of Disapproved Drainage Plans

- (a) A disapproved Drainage Plan may be resubmitted; with the revisions addressing the City's concerns documented in writing, to the City in accordance with 9-918 of this Ordinance and be subject to review as specified in 9-919 of this Ordinance. The applicable City Review Fee must accompany a resubmission of a disapproved Drainage Plan.

9-922 Schedule of Inspections

- (a) DEP or its designees (e.g., Dauphin County Conservation District) normally ensure compliance with any permits issued, including those for stormwater management. In addition to DEP compliance programs, the City or his City assignee may inspect all phases of the installation of the permanent stormwater management facilities.
- (b) During any stage of the Earth Disturbance activities, if the City determines that the permanent stormwater management facilities are not being installed in accordance with the approved Stormwater Management Plan, the City shall revoke any existing permits until a revised Drainage Plan is submitted and approved as specified in this Ordinance.

9-923 Right of Entry

- (a) Upon presentation of proper credentials, duly authorized representatives of the City may enter at reasonable times, upon any property within the City, to inspect the implementation, condition, or operations and maintenance of the stormwater BMPs in regard to any aspect governed by this Ordinance.
- (b) BMP owners and operators shall allow persons working on behalf of the City ready access to all parts of the premises for the purposes of determining compliance with this Ordinance.
- (c) Persons working on behalf of the City shall have the right to temporarily locate on any BMP in the City such devices, as are necessary, to conduct monitoring and/or sampling of the discharges from such BMP.
- (d) Unreasonable delay in allowing the City access to a BMP is a violation of this Article.

9-924 Stormwater Management Easements

- (a) Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by the City.
- (b) Stormwater management easements shall be provided by the property owner if necessary for: access for inspections and maintenance, or preservation of stormwater runoff conveyance, infiltration, and detention areas and other BMPs, by persons other than the property owner.

ARTICLE VI-PROHIBITIONS

9-925 Prohibited Discharges

- (a) No person in the City shall allow, or cause to allow, stormwater discharges into the City's separate storm sewer systems which are not composed entirely of stormwater, except as provided in 9-925(b) below, and discharges allowed under a state or federal permit.
- (b) Discharges, which may be allowed, based on a finding by the City that the discharge(s) do not significantly contribute to pollution to surface waters of the Commonwealth, are:

-Discharges from fire fighting activities	-Flows from riparian habitats and wetlands
-Potable water sources including dechlorinated water line and fire hydrant flushings	-Uncontaminated water from foundations or from footing drains
-Irrigation drainage	-Lawn watering
-Air conditioning condensate	-Dechlorinated swimming pool discharges
-Springs	-Uncontaminated groundwater
-Water from crawl space pumps	-Water from individual residential car washing
-Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used	-Routine external building washdown (which does not use detergents or other compounds)

- (c) In the event that the City determines that any of the discharges identified in 9-925(b), significantly contribute to pollution of waters of the Commonwealth, or is so notified by DEP, the City will notify the responsible person(s) to cease the discharge.
- (d) Upon notice provided by the City under 9-925(c), the discharger will have a reasonable time, as determined by the City, to cease the discharge consistent with the degree of pollution caused by the discharge.
- (e) Nothing in this Section shall affect a discharger's responsibilities under state law.

9-926 Prohibited Connections

- (a) The following connections are prohibited, except as provided in 9-925(b):
- (1) Any drain or conveyance, whether on the surface or subsurface, which allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter the City's separate storm sewer system, and any connections to the storm drain system from indoor drains and sinks; and
 - (2) Any drain or conveyance connected from a commercial or industrial land use to the City's separate storm sewer system, which has not been documented in plans, maps, or equivalent records, and approved by the City.

- 1719
- 1720
- 1721
- 1722
- 1723
- 1724
- 1725
- 1726
- 1727
- 1728
- 1729
- 1730
- 1731
- 9-927

Roof Drains

(a) Roof drains and sump pumps shall discharge to infiltration areas or vegetative BMPs to the maximum extent practicable.
- 9-928

Alteration of BMPs

(a) No person shall modify, remove, fill, landscape, or alter any existing stormwater BMP, unless it is part of an approved maintenance program, without the written approval of the City.

(b) No person shall place any structure, fill, landscaping, or vegetation into a stormwater BMP or within a drainage easement which would limit or alter the functioning of the BMP without the written approval of the City.

ARTICLE VII-FEES AND EXPENSES

9-929 General

- (a) The fee required by this Ordinance is the City Review Fee. The City Review fee shall be established by the City to defray review costs incurred by the City. The Applicant shall pay all fees.

9-930 City Drainage Plan Review Fee

- (a) The City shall establish a Review Fee Schedule by the City Engineer based on the size of the Earth Disturbance Activity and based on the City's costs for reviewing Drainage Plan. The City shall periodically update the Review Fee Schedule to ensure that review costs are adequately reimbursed, and post the same annually with the Office of the City Clerk.

9-931 Expenses Covered by Fees

- (a) The fees required by this Ordinance shall at a minimum cover:
- (1) Administrative and Clerical Costs
 - (2) The review of the Drainage Plan by the City.
 - (3) Pre-construction meetings
 - (4) The inspection of stormwater management facilities/BMPs and drainage improvements during construction
 - (5) The final inspection upon completion of the stormwater management facilities/BMPs and drainage improvements presented in the Drainage Plan
 - (6) Any additional work required to enforce any permit provisions regulated by this Ordinance, correct violations and assure proper completion of stipulated remedial actions

9-932 Recording of Approved Drainage Plan and Related Agreements

- (a) The owner of any land upon which permanent BMPs will be placed, constructed, or implemented, as described in the Drainage Plan, shall record the following documents in the Office of the Recorder of Deeds for Dauphin County, within fifteen (15) days of approval of the Drainage Plan by the City:
- (1) The Drainage Plan, or a summary thereof,
 - (2) Operations and Maintenance Agreements under Article VIII, and
 - (3) Easements under 9-924.
- (b) The City may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Section.

ARTICLE VIII-MAINTENANCE RESPONSIBILITIES

9-933 Performance Guarantee

- (a) The Applicant should provide a financial guarantee to the City for the timely installation and proper construction of all stormwater management controls as required by the approved Drainage Plan and this Ordinance, equal to 110% of the full construction cost of the required controls.

9-934 Maintenance Responsibilities

- (a) The Drainage Plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the City. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to insure proper operation of the facilities.
- (b) The Drainage Plan for the development site shall establish responsibilities for the continuing operating and maintenance of all proposed stormwater control facilities, consistent with the following principals:
- (1) If a development consists of structures or lots that are to be separately owned and in which streets, sewers, and other public improvements are to be dedicated to the City, stormwater control facilities/BMPs may also be dedicated to and maintained by the City.
 - (2) If a development site is to be maintained in a single ownership or if sewers and other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater control facilities/BMPs shall be the responsibility of the owner or private management entity.
- (c) The governing body, upon recommendation of the City, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the Drainage Plan. The governing body reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management controls/BMPs.
- (d) It shall be unlawful to alter or remove any permanent stormwater BMP required by an approved Drainage Plan, or to allow the property to remain in a condition, which does not conform to an approved Drainage Plan, unless the City grants an exception in writing.

9-935 Maintenance Agreement for Privately Owned Stormwater Facilities

- (a) Prior to final approval of the site's Drainage Plan, the property owner shall sign and record a maintenance agreement covering all stormwater control facilities that are to be privately owned. Said agreement, designated as Appendix C, is attached and made part hereto.
- (b) Other items may be included in the agreement where determined necessary to guarantee the satisfactory operation and maintenance of all BMP facilities. The maintenance agreement shall be subject to the review and approval of the City Solicitor and/or governing body.

1831 **9-936 City Stormwater Maintenance Fund**

1832
1833 (a) If the City accepts stormwater BMPs for dedication, persons installing stormwater storage
1834 facilities shall be required to pay a specified amount to the City Stormwater Maintenance Fund to
1835 help defray costs of periodic inspections and maintenance expenses. The amount of the deposit
1836 shall be determined as follows:

1837
1838 (1) If the stormwater BMP is to be owned and maintained by the City, the deposit shall cover
1839 the estimated costs for maintenance and inspections for ten (10) years. The City will
1840 establish the estimated costs utilizing information submitted by the Applicant.

1841
1842 (2) If the stormwater BMP is to be privately owned and maintained, the deposit shall cover
1843 the cost of periodic inspections performed by the City for a period of ten (10) years, as
1844 estimated by the City. After that period of time, inspections will be performed at the
1845 expense of the City.

1846
1847 (b) If a stormwater storage facility is proposed that also serves as a recreation facility (e.g. ball field,
1848 lake), the City may reduce or waive the amount of the maintenance fund deposit based upon the
1849 value of the land for public recreation purposes.

1850
1851 (c) If at some future time a stormwater BMP (whether publicly or privately owned) is eliminated due
1852 to the installation of storm sewers or other storage facility, the unused portion of the maintenance
1853 fund deposit will be applied to the cost of abandoning the facility and connecting to the storm
1854 sewer system or other facility. Any amount of the deposit remaining after the costs of
1855 abandonment are paid will be returned to the Depositor.

1856
1857 **9-937 Post-Construction Maintenance Inspections**

1858
1859 (a) Basins should be inspected by the land owner/developer or responsible entity (including the City
1860 for dedicated facilities) on the following basis:

1861
1862 (1) Annually for the first five (5) years
1863 (2) Once every two (2) years thereafter
1864 (3) During or immediately after the cessation of a one-hundred (100) year or greater
1865 storm event.

1866
1867 (b) The entity conducting the inspection should be required to submit a report to the City regarding
1868 the condition of the facility and recommending necessary repairs, if needed.

1869

ARTICLE IX-ENFORCEMENT AND PENALTIES

9-938 Right-of-Entry

- (a) Upon presentation of proper credentials, duly authorized representatives of the City may enter at reasonable times upon any property within the City to inspect the condition of the stormwater structures and facilities in regard to any aspect regulated by this Ordinance.

9-939 Notification

- (a) In the event that a person fails to comply with the requirements of this Ordinance, or fails to conform to the requirements of any permit issued hereunder, the City shall provide written notification of the violation. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violations(s). Failure to comply within the time specified shall subject such person to the penalty provision of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the City from pursuing any and all other remedies. It shall be the responsibility of the owner of the real property on which any Regulated Activity is proposed to occur, is occurring, or has occurred to comply with the terms and conditions of this Ordinance.

9-940 Enforcement

- (a) The City governing body is hereby authorized and directed to enforce all of the provisions of this Ordinance. All inspections regarding compliance with the Drainage Plan shall be the responsibility of the City or other qualified persons designated by the City.

- (b) A set of design plans approved by the City shall be on file at the site throughout the duration of the construction activity. The City or their designee may make periodic inspections during construction.

- (c) Adherence to Approved Plan

- (1) It shall be unlawful for any person, firm, or corporation to undertake any Regulated Activity under 9-935 on any property except as provided for in the approved Drainage Plan and pursuant to the requirements of this Ordinance. It shall be unlawful to alter or remove any control structure required by the Drainage Plan pursuant to this Ordinance or to allow the property to remain in a condition that does not conform to the approved Drainage Plan.

- (d) At the completion of the project and as a prerequisite for the release of the performance guarantee, the owner or his representatives shall:

- (1) Provide a certification of completion from an engineer, architect, surveyor or other qualified person verifying that all permanent facilities have been constructed according to the plans and specifications and approved revisions thereto.

- (2) Provide a set of as-built (record) drawings.

- (3) After receipt of the certification by the City, a final inspection shall be conducted by the governing body or its designee to certify compliance with this Ordinance.
- (e) Prior to revocation or suspension of a permit, the governing body will schedule a hearing to discuss the non-compliance if there is no immediate danger to life, public health, or property.
- (f) Suspension and Revocation of Permits
- (1) Any building, land development, or other permit or approval issued under this Ordinance may be suspended or revoked by the governing body for:
- (i) Non-compliance with or failure to implement any provision of the permit.
 - (ii) A violation of any provision of this Ordinance or any other applicable law, Ordinance, rule or regulation relating to the project.
 - (iii) The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution, or which endangers the life or property of others.
- (2) Suspended permit shall be reinstated by the governing body when:
- (i) The City or his designee has inspected and approved the corrections to the stormwater management and erosion and sediment pollution control measure(s) or the elimination of the hazard or nuisance and/or;
 - (ii) The governing body is satisfied that the violation of the Ordinance, law, or rule and regulation has been corrected.
- (3) A permit that has been revoked by the governing body cannot be reinstated. The Applicant may apply for a new permit under the procedures outlined in this Ordinance.
- (g) Occupancy Permit
- (1) An occupancy permit shall not be issued unless the certification of compliance pursuant to 9-940(d) has been secured. The occupancy permit shall be required for each lot owner and/or developer for all subdivisions and land development in the City.

9-941 Public Nuisance

- (a) The violation of any provision of this Ordinance is hereby deemed a Public Nuisance.
- (b) Each day that a violation continues shall constitute a separate violation.

1970 **9-942** **Penalties**

1971

- 1972 (a) Any person who violates the provisions of this chapter shall be subject to the General Code
1973 Penalty, Section 1-301.99, of these Codified Ordinances.

1974

1975

1976

1977

1978

1979

1980

1981 **9-943** **Appeals**

1982

- 1983 (a) Any person aggrieved by any action of the City or its designee, relevant to the provisions of this
1984 Ordinance, may appeal to the City Housing Code Board of Appeals within thirty (30) days of
1985 that action.

1986

- 1987 (b) Any person aggrieved by any decision of the City's Housing Code Board of Appeals, relevant to
1988 the provisions of this Ordinance, may appeal to the Dauphin County Court of Common Pleas
1989 within thirty (30) days of the City's decision.

1990
1991
1992
1993

APPENDIX A - STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE A-1 - DESIGN STORM RAINFALL AMOUNT

Return Interval (Year)	24-hour Rainfall Total (inches)
2	2.92
5	3.66
10	4.32
25	5.35
50	6.30
100	7.41

Source: NOAA Atlas 14

1994
1995
1996
1997

TABLE A-2 - RUNOFF CURVE NUMBERS (FROM NRCS (SCS) TR-55)

Runoff Curve Numbers for Urban Areas					
Cover Description		Curve Numbers for Hydrologic Soil Groups			
Cover Type and Hydrologic Condition	Average % Impervious Area	A	B	C	D
Fully Developed Urban Areas (Vegetation Established)					
Open Space (lawns, parks, golf courses, etc)					
Poor Condition (grass cover < 50%)		68	79	86	89
Fair Condition (grass cover 50% to 75%)		49	69	79	84
Good Condition (grass cover > 75%)		39	61	74	80
Impervious Areas					
Paved Parking Lots, Roofs, Driveways, etc.		98	98	98	98
Streets and Roads					
Paved: Curbed and Storm Sewers		98	98	98	98
Paved: Open Ditches		83	89	92	93
Gravel		76	85	89	91
Dirt		72	82	87	89
Western Desert Urban Areas					
Natural Desert Landscaping (pervious area only)		63	77	85	88
Artificial Desert Landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban Districts					
Commercial and Business	85%	89	92	94	95
Industrial	72%	81	88	91	93
Residential Districts by Average Lot Size					
1/8 Acres	65%	77	85	90	92
1/4 Acre	38%	61	75	83	87
1/3 Acre	30%	57	72	81	86
1/2 Acre	25%	54	70	80	85
1 Acre	20%	51	68	79	84
2 Acres	12%	46	65	77	82

Runoff Curve Numbers for Cultivated Agricultural Lands						
Cover Description			Curve Numbers for Hydrologic Soil Groups			
<i>Cover Type</i>	<i>Treatment</i>	<i>Hydrologic Condition</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Fallow	Bare Soil	--	77	86	91	94
	Crop Residue Cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row Crops	Straight Row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & Terraced (C & T)	Poor	66	74	80	82
		Good	62	71	78	81
	C & T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small Grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C & T	Poor	61	72	79	82
		Good	59	70	78	81
	C & T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close Seeded or Broadcast Legumes Or Rotation Meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C & T	Poor	63	73	80	83
		Good	51	67	76	80

Runoff Curve Numbers for Other Agricultural Lands						
Cover Description		Curve Numbers for Hydrologic Soil Groups				
<i>Cover Type</i>	<i>Hydrologic Condition</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	
Pasture, Grassland, or Range – Continuous Forage for Grazing	Poor	68	79	86	89	
	Fair	49	69	79	84	
	Good	39	61	74	80	
Meadow – Continuous Grass, Protected from Grazing and Generally Mowed for Hay	--	30	58	71	78	
Brush – Brush, Weed, Grass Mixture with brush the major element	Poor	48	67	77	83	
	Fair	35	56	70	77	
	Good	30	48	65	73	
Woods – Grass Combination (orchard or tree farm)	Poor	57	73	82	86	
	Fair	43	65	76	82	
	Good	32	58	72	79	
Woods	Poor	45	66	77	83	
	Fair	36	60	73	79	
	Good	30	55	70	77	
Farmsteads – Buildings, Lanes, Driveways and Surrounding Lots.	--	59	74	82	86	
Runoff Curve Numbers for Cultivated Agricultural Lands						
Cover Description		Curve Numbers for Hydrologic Soil Groups				
<i>Cover Type</i>	<i>Hydrologic Condition</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	
Herbaceous – Mixture of Grass, Weeds and Low-Growing Brush, With Brush the Minor Element.	Poor	--	80	87	93	
	Fair		71	81	89	
	Good		62	74	85	
Oak-Aspen – Mountain Brush Mixture of Oak Brush, Aspen, Mountain Mahogany, Bitter Brush, Maple and other brush.	Poor		66	74	79	
	Fair		48	57	63	
	Good		30	41	48	
Pinyon-Juniper – Pinyon, Juniper, or both; Grass under story.	Poor		75	85	89	
	Fair		58	73	80	
	Good		41	61	71	
Sagebrush With Grass under story.	Poor		67	80	85	

	Fair		51	63	70
	Good		35	47	55
Desert Shrub – Major Plants Include Saltbrush, Greasewood, Creosotebush, Blackbrush, Bursage, Palo Verde, Mesquite and Cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

TABLE A-3 - RATIONAL RUNOFF COEFFICIENTS

Character of Surface	Return Period (Yrs)						
	2	5	10	25	50	100	500
Developed							
Asphaltic	0.73	0.77	0.81	0.86	0.90	0.95	1.00
Concrete/Roof	0.75	0.80	0.83	0.88	0.92	0.97	1.00
Grass Areas (<i>lawn, parks, etc</i>)							
Poor condition (grass cover less than 50% of the area)							
Flat, 0-2%	0.32	0.34	0.37	0.40	0.44	0.47	0.58
Average, 2-7%	0.37	0.40	0.43	0.46	0.49	0.53	0.61
Steep, over 7%	0.42	0.43	0.45	0.49	0.52	0.55	0.62
Fair condition (grass cover on 50% to 75% of the area)							
Flat, 0-2%	0.25	0.28	0.30	0.34	0.37	0.41	0.53
Average, 2-7%	0.33	0.36	0.38	0.42	0.45	0.49	0.58
Steep, over 7%	0.37	0.40	0.42	0.46	0.49	0.53	0.60
Good condition (grass cover larger than 75% of the area)							
Flat, 0-2%	0.21	0.23	0.25	0.29	0.32	0.36	0.49
Average, 2-7%	0.29	0.32	0.35	0.39	0.42	0.46	0.56
Steep, over 7%	0.34	0.37	0.40	0.44	0.47	0.51	0.58
Undeveloped							
Cultivated Land							
Flat, 0-2%	0.31	0.34	0.36	0.40	0.43	0.47	0.57
Average, 2-7%	0.35	0.38	0.41	0.44	0.48	0.51	0.60
Steep, over 7%	0.39	0.42	0.44	0.48	0.51	0.54	0.61
Pasture/Range							
Flat, 0-2%	0.25	0.28	0.30	0.34	0.37	0.41	0.53
Average, 2-7%	0.33	0.36	0.38	0.42	0.45	0.49	0.58
Steep, over 7%	0.37	0.40	0.42	0.46	0.49	0.53	0.60
Forest/Woodlands							
Flat, 0-2%	0.22	0.25	0.28	0.31	0.35	0.39	0.48
Average, 2-7%	0.31	0.34	0.36	0.40	0.43	0.47	0.56
Steep, over 7%	0.35	0.39	0.41	0.45	0.48	0.52	0.58

2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039

TABLE A-4 - MANNING ROUGHNESS COEFFICIENTS

Material	Typical Manning Roughness Coefficient
Concrete	0.012
Gravel Bottom with Sides - Concrete	0.02
- Mortared Stone	0.023
- RipRap	0.033
Natural Stream Channels	
Clean, Straight Stream	0.030
Clean, Winding Stream	0.040
Winding With Weeds and Pools	0.050
With Heavy Brush and Timber	0.100
Flood Plains	
Pasture	0.035
Field Crops	0.040
Light Brush and Weeds	0.050
Dense Brush	0.070
Dense Trees	0.100

DRAINAGE PLAN APPLICATION

(To be attached to the "land subdivision plan or development plan review application or "minor land subdivision plan review application")

Application is hereby made for review of the Drainage and Erosion and Sedimentation Control Plan and related data as submitted herewith in accordance with The City of Harrisburg's Stormwater Management and Earth Disturbance Ordinance.

_____ final plan _____ preliminary plan _____ sketch plan

Date of Submission: _____ Submission No: _____

Name of subdivision or development: _____

Name of Applicant _____ Telephone No. _____

(If corporation, list the corporation's name and the names of two officers of the corporation)

Address _____

City _____ Zip Code _____

Applicant's interest in subdivision or development _____

(If other than property owner give owners name and address)

Name of property owner _____ Telephone No. _____

Address _____ City _____

Zip Code _____

Name of engineer or surveyor _____

Telephone no. _____ Address _____

City _____ Zip Code _____

2083
2084 Type of subdivision or development proposed:
2085

<input type="checkbox"/> Single Family lots	<input type="checkbox"/> Townhouses	<input type="checkbox"/> Commercial (multi lot)
<input type="checkbox"/> Two Family lots	<input type="checkbox"/> Garden Apartments	<input type="checkbox"/> Commercial (one lot)
<input type="checkbox"/> Cluster lots	<input type="checkbox"/> Campground	<input type="checkbox"/> Industrial (one lot)
<input type="checkbox"/> Planned Residential	<input type="checkbox"/> Other	

2086
2087 If other, describe type of development _____
2088
2089 Lineal feet of new road proposed? _____ l.f.
2090
2091 Area of proposed and existing impervious area on entire tract.
2092
2093 Existing (to remain) _____ s.f. _____ % of property
2094 Proposed _____ s.f. _____ % of property
2095
2096 **Stormwater**
2097
2098 Does the peak rate of runoff from proposed conditions exceed that flow which occurred for
2099 predevelopment conditions for the designated design storm?
2100
2101 _____
2102
2103 Design storm utilized (on-site conveyance systems) (24 hr.)
2104 (Check one)
2105
2106 -No. of Subwatershed Area _____
2107 -Watershed name _____
2108 -If other, explain: _____
2109 _____
2110
2111 Does the submission meet the release rate and/or district criteria for the applicable sub area?
2112 _____
2113
2114 Number of sub areas from Plate 6, of the _____ Watershed Stormwater Management
2115 Plan.
2116
2117 Type of proposed runoff control _____
2118
2119 Does the proposed stormwater control criterion meet the requirement/guidelines of the stormwater
2120 Ordinance? _____
2121
2122 Does the plan meet the requirements of Article III of the Stormwater Ordinance? _____
2123
2124 Was TR-55 utilized in determining the time of concentration? _____
2125
2126 What hydrologic method was used in the stormwater computations? _____
2127 Is a hydraulic routing through the stormwater control structure submitted?
2128 _____

2129

2130 Is a construction schedule or staging attached? _____

2131

2132 Is a recommended maintenance program attached? _____

2133

2134 Has an Erosion and sediment pollution control (E&S Plan) been submitted to the Dauphin County

2135 Conservation District?

2136

2137 Total area of earth disturbance _____ s.f.

2138

2139 **Wetlands**

2140

2141 Have the wetlands been delineated by someone trained in wetland delineation?

2142 _____

2143

2144 Have the wetland lines been verified by a state or federal permitting authority?

2145 _____

2146

2147 Have the wetland lines been surveyed? _____

2148

2149 Total acreage of wetland within the property _____

2150

2151 Total acreage of wetland disturbed _____

2152

2153 Supporting documentation _____

2154

2155 **Filing**

2156

2157 Has the required fee been submitted? _____

2158

2159 Amount \$ _____

2160

2161 Has the proposed schedule of construction inspection to be performed by the Applicant's engineer been

2162 submitted? _____

2163

2164 Name of individual who will be making the inspections _____

2165 _____

2166

2167 General comments about stormwater management at development site

2168 _____

2169 _____

2170

On this the _____ day of _____, 20____, before me, the undersigned officer, personally appeared _____ who being duly sworn, according to law, deposes and says that _____ owners of the property described in this application and that the application was made with _____ knowledge and/or direction and does hereby agree with the said application and to the submission of the same.

My Commission Expires _____, 20____

Notary Public

THE UNDERSIGNED HEREBY CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE AND BELIEF THE INFORMATION AND STATEMENTS GIVEN ABOVE ARE TRUE AND CORRECT.

SIGNATURE OF APPLICANT_____

_____ Municipality official submission receipt

Date complete application received _____ plan number _____

Fees _____ date fees paid _____ received by _____

Official submission receipt date _____

Received by _____

2218 **FEE SCHEDULE**

2219 _____ Municipality **Drainage Plan Schedule of Fees**

2220

2221 Subdivision name _____ Submittal no. _____

2222

2223 Owner _____ Date _____

2224

2225 Engineer _____

2226

2227 1. Filing fee \$ _____

2228 2. Land use

2229 2a. Subdivision, campgrounds, mobile home parks and \$ _____

2230 Multi-family dwelling where the units are located

2231 in the same local watershed

2232 2b. Multi-family dwelling where the designated open space \$ _____

2233 is located in a different local watershed from the

2234 proposed units.

2235 2c. Commercial/industrial \$ _____

2236 3. Relative amount of earth disturbance

2237 3a. Residential

2238 road <500 l.f. \$ _____

2239 road 500-2,640 l.f. \$ _____

2240 road >2,640 l.f. \$ _____

2241 3b. Commercial/industrial and other

2242 impervious area <3,500 s.f. \$ _____

2243 impervious area 3,500-43,460 s.f. \$ _____

2244 impervious area >43,560 s.f. \$ _____

2245 4. Relative size of project

2246 4a. Total tract area <1 ac \$ _____

2247 1-5 ac \$ _____

2248 5-25 ac \$ _____

2249 25-100 ac \$ _____

2250 100-200 ac \$ _____

2251 >200 ac \$ _____

2252 5. Stormwater control measures

2253 5a. Detention basins & other controls which \$ _____

2254 require a review of hydraulic routings

2255 (\$ per control)

2256 5b. Other control facilities which require \$ _____

2257 storage volume calculations but no hydraulic

2258 routings. (\$ per control)

2259

2260 6. Site inspection (\$ per inspection) \$ _____

2261

2262 **Total** \$ _____

2263

2264 All subsequent reviews shall be 1/4 the amount of the initial review fee unless a new application is

2265 required as per Article IV of the stormwater Ordinance. A new fee shall be submitted with each revision

2266 in accordance with this schedule.

APPENDIX C - MAINTENANCE & MONITORING AGREEMENT

STANDARD STORMWATER FACILITIES MAINTENANCE AND MONITORING AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20__, by and between _____, (hereinafter the "Landowner") and _____, _____ County; Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of _____ County, Pennsylvania, Deed Book _____ at Page _____, (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the Subdivision/Land Management Plan (hereinafter "Plan") for the _____ Subdivision which is expressly made a part hereof, as approved or to be approved by the Municipality, provides for detention or retention of stormwater within the confines of the Property; and

WHEREAS, the Municipality and the Landowner, his successors and assigns agree that the health, safety and welfare of the residents of the Municipality require that on-site stormwater management facilities be constructed and maintained on the Property: and

WHEREAS, the Municipality requires, through the implementation of the _____ Watershed Stormwater Management Plan, that stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, his successors and assigns.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein and the following terms and conditions, the parties hereto agree as follows:

The on-site stormwater management facilities shall be constructed by the Landowner, his successors and assigns, in accordance with the terms, conditions and specifications identified in the Plan.

The Landowner, his successors and assigns, shall maintain the stormwater management facilities in good working condition, acceptable to the Municipality so that they are performing their design functions

The Landowner, his successors and assigns, hereby grants permission to the Municipality, his authorized agents and employees, upon presentation of proper identification, to enter upon the Property at reasonable times to inspect the stormwater management facilities whenever the Municipality deems necessary. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structures, pond areas, access roads, etc. When inspections are conducted, the Municipality shall give the Landowner, his successors and assigns, copies of the inspection report with findings and evaluations. At a minimum, maintenance inspections shall be performed in accordance with the following schedule:

2307 Annually for the first five (5) years after the construction of the stormwater facilities,
 2308 Once every two (2) years thereafter, or
 2309 During or immediately upon the cessation of a 100 year or greater precipitation event.
 2310
 2311 All reasonable costs for said inspections shall be born by the Landowner and payable to the
 2312 Municipality.
 2313
 2314 The owner shall convey to the Municipality easements and/or rights-of-way to assure access for periodic
 2315 inspections by the Municipality and maintenance if required.
 2316
 2317 In the event the Landowner, his successors and assigns, fails to maintain the stormwater management
 2318 facilities in good working condition acceptable to the Municipality, the Municipality may enter upon
 2319 the property and take such necessary and prudent action to maintain said stormwater management
 2320 facilities and to charge the costs of the maintenance and/or repairs to the Landowner, his successors
 2321 and assigns. This provision shall not be construed as to allow the Municipality to erect any structure
 2322 of a permanent nature on the land of the Landowner outside of any easement belonging to the
 2323 Municipality. It is expressly understood and agreed that the Municipality is under no obligation to
 2324 maintain or repair said facilities and in no event shall this Agreement be construed to impose any such
 obligation on the Municipality.
 2325
 2326 The Landowner, his successors and assigns, will perform maintenance in accordance with the
 2327 maintenance schedule for the stormwater management facilities including sediment removal as
 outlined on the approved schedule and/or Subdivision/Land Management Plan.
 2328
 2329 In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any
 2330 funds in performance of said work for labor, use of equipment, supplies, materials and the like on
 2331 account of the Landowner's or his successors' and assigns' failure to perform such work, the
 2332 Landowner, his successors and assigns, shall reimburse the Municipality upon demand, within 30
 2333 days of receipt of invoice thereof, for all costs incurred by the Municipality hereunder. If not paid
 2334 within said 30-day period, the Municipality may enter a lien against the property in the amount of
 2335 such costs or may proceed to recover his costs through proceedings in equity or at law as authorized
 under the provisions of the _____ Code.
 2336
 2337 The Landowner, his successors and assigns, shall indemnify the Municipality and his agents and
 2338 employees against any and all damages, accidents, casualties, occurrences or claims which might
 2339 arise or be asserted against the Municipality for the construction, presence, existence or maintenance
 of the stormwater management facilities by the Landowner, his successors and assigns.
 2340
 2341 In the event a claim is asserted against the Municipality, his agents or employees, the Municipality shall
 2342 promptly notify the Landowner, his successors and assigns and they shall defend, at their own
 2343 expense, any suit based on such claim. If any judgment or claims against the Municipality, his agents
 2344 or employees shall be allowed, the Landowner, his successors and assigns shall pay all costs and
 expenses in connection therewith.
 2345
 2346 In the advent of an emergency or the occurrence of special or unusual circumstances or situations, the
 2347 Municipality may enter the Property, if the Landowner is not immediately available, without
 2348 notification or identification, to inspect and perform necessary maintenance and repairs, if needed,
 2349 when the health, safety or welfare of the citizens is at jeopardy. However, the Municipality shall
 2350 notify the landowner of any inspection, maintenance, or repair undertaken within 5 days of the
 2351 activity. The Landowner shall reimburse the Municipality for his costs.

2352
2353 **This Agreement shall be recorded among the land records of _____**
2354 **County, Pennsylvania and shall constitute a covenant running with the Property and/or equitable**
2355 **servitude and shall be binding on the Landowner, his administrators, executors, assigns, heirs and**
2356 **any other successors in interests, in perpetuity.**
2357

2358 ATTEST:

2359 WITNESS the following signatures and seals:

2360 (SEAL)

For the Municipality:

2361

2362

(SEAL)

For the Landowner:

2363

2364

2365 ATTEST:

2366 _____ (City, Borough, Township)

2367 County of _____, Pennsylvania

2368

2369 I, _____, a Notary Public in and for the County and State
2370 aforesaid, whose commission expires on the _____ day of _____, 20__, do hereby
2371 certify that _____ whose name(s) is/are signed to the
2372 foregoing Agreement bearing date of the _____ day of _____, 20__, has
2373 acknowledged the same before me in my said County and State.

2374

2375 **GIVEN UNDER MY HAND THIS _____ day of _____, 20__.**

2376

2377

NOTARY PUBLIC (SEAL)

2378

2379

2380

APPENDIX D - CHANNEL PROTECTION STORAGE

The following procedure shall be used to design the Channel Protection Storage Volume (C_{pv}). The method is based on the Design Procedures for Stormwater Management Extended Detention Structures (MDE, 1987) and utilizes the NRCS, TR-55 Graphical Peak Discharge Method (USDA, 1986).

Compute the time of concentration (t_c) and the one-year post-development runoff depth (Q_a) in inches.

$$Q_a = \frac{(P - I_a)^2}{(P - I_a) + S} \quad Q_a = \frac{(2.5 - I_a)^2}{(2.5 - I_a) + S} \quad \text{where } S = (1000/CN) - 10$$

$$I_a = (200/CN) - 2$$

$P = 2.5'' = 1\text{-year rainfall depth}$

Compute the ratio I_a/P where $P = 2.5''$ and is the one-year rainfall depth (Source: NRCS (SCS) TR-55).

With t_c and I_a/P , find the unit peak discharge (q_u) from Figure D.1 and compute the one year post-development peak discharge $q_i = (q_u)(A)(Q_a)$ where (A) is the drainage area in **square miles**. Therefore, q_i represents the peak inflow to the BMP.

If $Q_i \geq 2.0$ cfs, C_{pv} is required. With q_u , find the ratio of outflow to inflow (q_o/q_i) for $T = 24$ hours from Figure D.2.

Compute the peak outflow discharge $q_o = (q_o/q_i)(q_i)$

With q_o/q_i , compute the ratio of storage to runoff volume (V_s/V_r). Where V_s = volume of storage and V_r = volume of runoff

$$V_s/V_r = 0.683 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3$$

Compute the extended detention storage in inches $V_i = (V_s/V_r)(V_r)$. **Note:** $V_r = Q_a$

Compute the extended detention storage volume $C_{pv} = (V_i)(A)$ where A is the total drainage area in acres. Convert C_{pv} to acre-feet by $(C_{pv}/12)$, where C_{pv} is in inches.

Compute the required orifice area A_o for extended detention design:

$$A_o = \frac{q_o}{C(2gh_o)^{0.5}} = \frac{q_o}{4.18(h_o)^{0.5}}$$

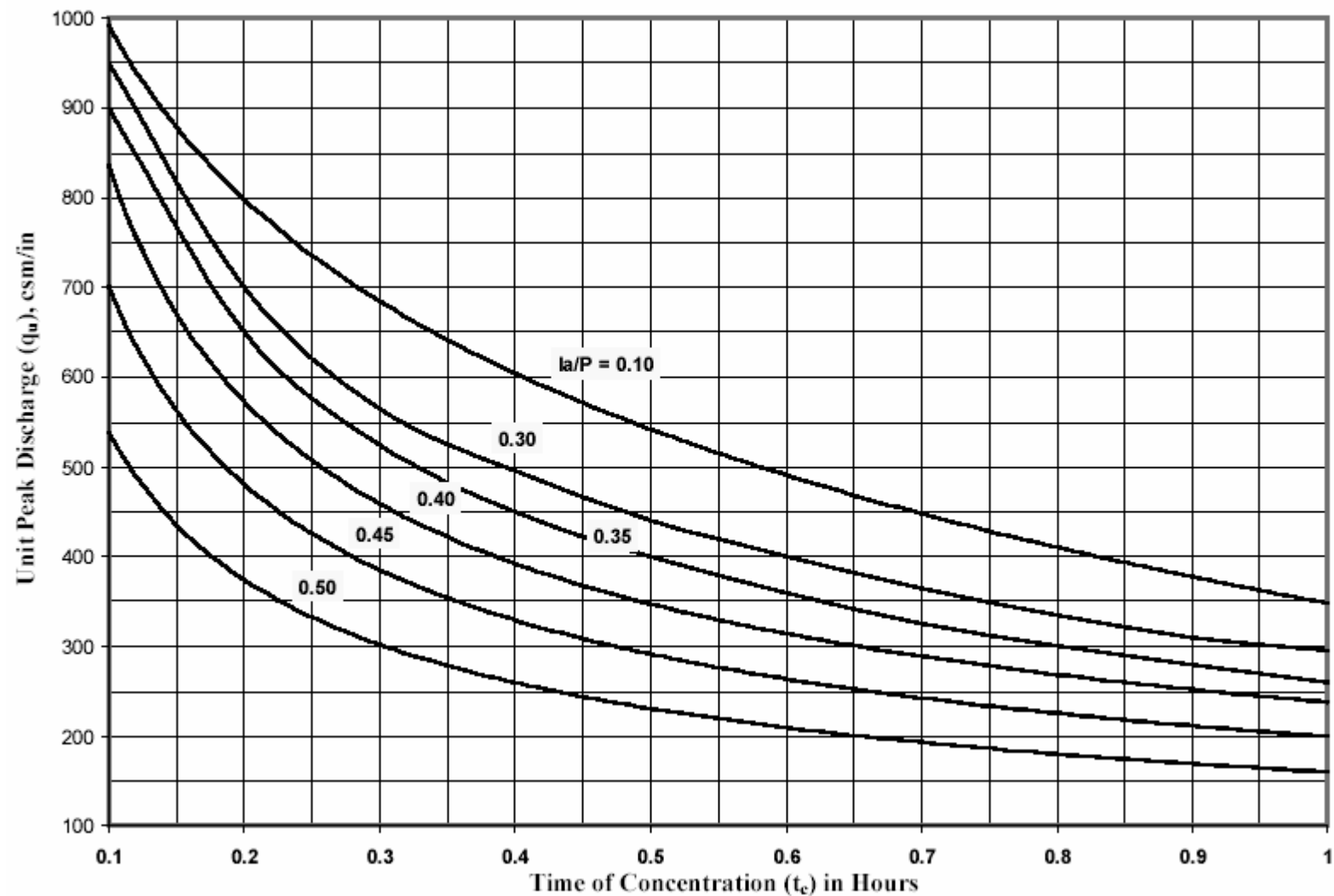
Where h_o is the maximum storage depth associated with V_s .

Determine the required maximum orifice diameter $d_o = (4(A_o)/\pi)^{0.5}$

A d_o of less than 3 inches is subject to local jurisdictional approval, and is not recommended unless an internal control for orifice protection is used.

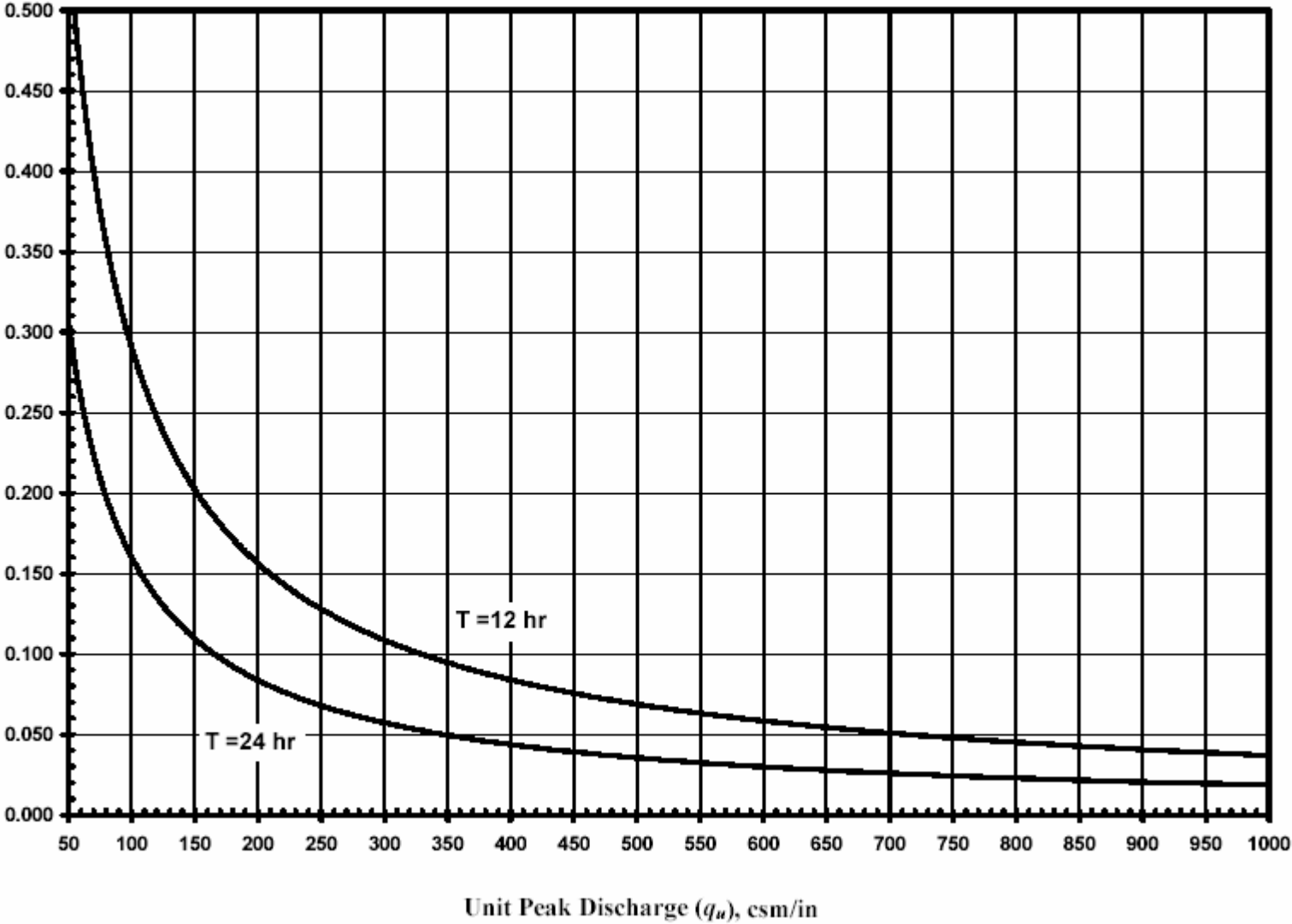
- **If $Q_i \leq 2.0$ cfs, C_{pv} is not required.** Provide for water quality (WQv) and groundwater recharge (Re_v) as necessary.

2430 **Figure D.1 SCS Graphical Method of Determining Peak Discharge (q_u) in csm/in**
 2431 **For 24-Hour Type II Storm Distribution**



2432

2433 **Figure D.2 Detention Time Versus Discharge Ratios (q_o/q_i)**



2434

**LOW IMPACT DEVELOPMENT PRACTICES
ALTERNATIVE APPROACH FOR
MANAGING STORMWATER RUNOFF**

Natural hydrologic conditions may be altered radically by poorly planned development practices, such as introducing unneeded impervious surfaces, destroying existing drainage swales, constructing unnecessary storm sewers, and changing local topography. A traditional drainage approach of development has been to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach leads ultimately to the degradation of water quality as well as expenditure of additional resources for detaining and managing concentrated runoff at some downstream location.

The recommended alternative approach is to promote practices that will minimize post-development runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate pre-development hydrologic conditions, forced infiltration is often necessary to offset the loss of infiltration by creation of impervious surfaces. The ability of the ground to infiltrate depends upon the soil types and its conditions.

Preserving natural hydrologic conditions requires careful alternative site design considerations. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. A well-designed site will contain a mix of all those features. The following describes various techniques to achieve the alternative approach:

- ◆ Preserving Natural Drainage Features. Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern -- streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.
- ◆ Protecting Natural Depression Storage Areas. Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff volumes and trap pollutants. The volume and release-rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.
- ◆ Avoiding introduction of impervious areas. Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.

- ◆ Reducing the Hydraulic Connectivity of Impervious Surfaces. Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.
- ◆ Routing Roof Runoff over Lawns. Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.
- ◆ Reducing the Use of Storm Sewers. By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a “reasonable” time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.
- ◆ Reducing Street Widths. Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Borough planners and traffic designers should encourage narrower neighborhood streets that ultimately could lower maintenance.
- ◆ Limiting Sidewalks to One Side of the Street. A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.
- ◆ Using Permeable-Paving Materials. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.
- ◆ Reducing Building Setbacks. Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.
- ◆ Constructing Cluster Developments. Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

In summary, a careful consideration of the existing topography and implementation of a combination of the above mentioned techniques may avoid construction of costly stormwater control measures. Other benefits include reduced potential of downstream flooding, water quality degradation of receiving streams/water bodies and enhancement of aesthetics and reduction of development costs. Beneficial results include more stable base flows in receiving streams, improved groundwater

recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

Repealer

- (a) Any ordinance or ordinance provision(s) of the City inconsistent with any of the provision(s) of this Ordinance is hereby repealed to the extent of the inconsistency only.
- (b) Except for inconsistent Ordinances and Practices that are repealed by this Ordinance, local storm water management design criteria (e.g. inlet spacing, inlet type, collection system design and details, outlet structure design, etc.) shall continue to be regulated by the applicable City Ordinances or at the City's discretion.

Severability

- (a) Should a court of competent jurisdiction declare any section(s) or provision(s) of this Ordinance invalid, such decision shall not affect the validity of any of the remaining section(s) or provision(s) of this Ordinance.

Compatibility with Other Ordinance Requirements

- (a) Approvals issued pursuant to this Ordinance do not relieve the Applicant of the responsibility to comply with or to secure required permits or approvals for activities regulated by any other applicable codes, rules, statutes, or ordinances. To the extent that this Ordinance imposes more rigorous or stringent requirements for stormwater management, the specific requirements contained in this Ordinance shall be followed.

Effective Date

This ordinance shall take effect in accordance with the law.

Seconded by: _____